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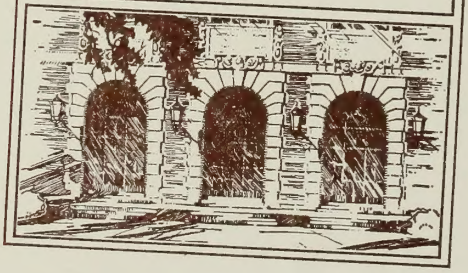

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	min	minute(s)
ADP	adenosine diphosphate	ml	milliliter(s)
AMP	adenosine monophosphate	mm	millimeter(s)
ATP	adenosine triphosphate	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotanamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotide phosphate
CNS	central nervous system	NADPH	reduced nicotinamide adenine dinucleotide phosphate
cpm	counts per minute	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	pg	picogram (10^{-12})
e.g.	for example	p.o.	orally
g	gram(s)	ppm	parts per million
µg	microgram(s)	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
i.m.	intramuscular	resp.	respectively
i.p.	intraperitoneal	Rev.	review (only in citations)
IU	international unit(s)	RNA	ribonucleic acid
i.v.	intravenous	s.c.	subcutaneous
kg	kilogram(s)	sec	second(s)
LD$_{50}$	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase	SGPT	serum glutamic-pyruvic transaminase
m	meter(s)	U	unit(s)
M	molar	UV	ultraviolet
mEq	milliequivalent(s)	WBC	white blood cells (leukocytes), white blood count
mM	millimolar	yr	year(s)
µM	micromolar		
mC,µC	milli-,microcurie(s)		
mg	milligram(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5401 PENICILLAMINE INDUCED CHANGES IN GROWING RATS. II. LIVER PARENCHYMAL CELL. (E.) Riede, U. N. (Univ. Pathol. Inst., Basel, Switzerland), M. Roth, J. J. Molnar, L. Bianchi and H. P. Rohr. *Experientia* 27(7):794-797, 1971.

The effect of chronic penicillamine administration (200 mg/day for 7 weeks) on liver cell ultrastructure was studied stereometrically in male Wistar rats. A marked difference in body weight increase was observed between penicillamine-treated rats (25%) and untreated controls (125%). While there were no changes in either rough or smooth endoplasmic reticulum, lysosomes, bile canaliculi or microvilli, microbodies and mitochondria seemed to be enlarged, the latter showing numerous cristae and an unaltered electron density of their matrix. The surface density of the mitochondrial outer membranes and cristae were augmented 68% and 84%, resp., as determined by morphometric analysis. The effect of penicillamine on mitochondrial cristae may represent defective compensation of inefficient membrane-bound enzymes resulting in a lack of cell energy, triggering the growth of mitochondria and the formation of new cristae.

5402 INNERVATION OF THE LIVER AND BILE DUCTS. (Pol.) Stelmasiak, M. (Med. Acad. Inst. Human Anat., Lublin, Poland) and L. Kurylcio. *Folia Morphol. (Warsz.)* 30(2):169-181, 1971.

The position, nerve composition and distribution of terminal branches of the hepatic plexuses were studied in 173 human cadavers. The anterior hepatic plexus which is located within the hepatoduodenal ligament is composed of branches from the posterior and anterior (8.09% and 98.84%, resp.) trunks of the vagus, branches of the main nerves of the smaller curvature of the stomach (9.25% from the anterior, 5.20% from posterior), bundles of fibers from the splanchnic branch (100%) of the posterior trunk of the vagus and branches of the splanchnic plexus (100%). The posterior hepatic plexus which is located behind the portal vein is composed of fibers of the splanchnic branch of the posterior vagus trunk (100%) and branches of the splanchnic plexus (100%). The anterior and posterior hepatic plexuses supplied the liver, bile ducts, pyloric segment of the stomach, head of the pancreas and descending arms of the duodenum. Among the branches of the posterior plexus were the nerves of the common bile duct which almost always ran along the posterior surface of the duct as far as the hepatopancreatic ampulla. The practical significance of these studies for surgery is stressed (especially denervation methods of different organs or segments).

5403 CORRELATION BETWEEN HISTOLOGICAL AND BIOCHEMICAL PARAMETERS OF ISOLATED PERFUSED RAT LIVER. (E.) Oomen, H. A. P. C. (U. Amsterdam Dept. Pathol. Anat., Netherlands) and R. A. F. M. Chamalaun. *Virchows Arch.* [*Zellpathol.*] 8(1):243-251, 1971.

A comparison was made of the biochemical and morphological findings observed in 23 isolated perfused rat livers in which nitrogen metabolism was studied. In 14 of the 23 liver perfusions there was a satisfactory correlation between biochemical and histological evaluation, with the best correlation being obtained in livers characterized as excellent and bad (on the basis of histological and biochemical data). Discrepancies between the 2 evaluations were found in 9 livers; in 8 cases according to one qualification and in one case according to two. In 8 cases slight histological changes were already present without perceptible deterioration according to biochemical criteria. After short-term perfusion (90-120 min) it was possible to observe distinct structural and cellular transformation by routine microscopy of 2 μ sections stained with hematoxylin-eosin, periodic acid silver methenamine and phosphotungstic acid-hematoxylin. Histology is seemingly useful in evaluating liver condition during perfusion.

5404 THE RESPONSE OF THE RETICULOENDOTHELIAL SYSTEM TO SKIN TRANSPLANTATION. THE CELLULAR BASIS OF HEPATOSPLENOMEGALY IN MICE BEARING SKIN GRAFTS AND ITS SIGNIFICANCE. (E.) Gotjamanos, T. (U. Adelaide Dept. Surg., Microbiol., Australia). *Aust. J. Exp. Biol. Med. Sci.* 49(3):259-270, 1971.

The basis and significance of cellular changes of liver and splenic enlargement were studied in Balb/c mice bearing skin grafts. Mice bearing either 4 cm^2 allografts as well as massive allografts or isografts developed enlarged livers due to hepatocyte hypertrophy rather than increased cell proliferation. The most prominent alteration in hepatocyte fine structure in mice with 4 cm^2 allografts was a large increase in amount of rough-surfaced endoplasmic reticulum distributed in inter- and perimitochondrial positions with many ribosomal strands closely opposed to the mitochondrial membranes. RNA concentration in allografted and isografted mice was 19-26% greater than controls. Liver RNA concentrations were also different relative to controls, whereas no difference was observed between allografted and isografted mice. Histological changes in mice bearing 4 and 8 cm^2 allografts showed increased (above normal) hematopoiesis up to the time of rejection, generalized enlargement of lymphatic nodules and germinal center formation. Spleens from mice bearing 4 and 8 cm^2 isografts showed little change in lymphatic nodules with no germinal center developmemt. Intense hematopoiesis was observed (mostly erythropoietic as opposed to the granulopoiesis of allografts). Hepatomegaly and increased RNA production seem to result from both increased amounts of purines needed to sustain cellular proliferation in lymphoid tissue and plasma proteins (α and β globulins and fibrinogen). Splenic enlargement seems to result from hematopoiesis resulting from blood loss due to surgery in the case of isografts and a granulocytic polymorphonuclear response needed to remove dead tissue in the case of allografts.

5405 THE CAUSE OF PANCREATIC ENLARGEMENT IN RATS FED RAW SOYBEAN. (E.) Beswick, I. P. (Roy. Free Hosp., London), R. C. Pirola and I. A. D. Bouchier. *Br. J. Exp. Pathol.* 52(3): 252-255, 1971.

The mean pancreatic weight was higher in animals that were given a raw soybean diet than in control animals (soybean heated to inactivate the trypsin inhibitor). Microsccpic examination revealed that the exocrine secretory acini and their component epithelial cells in the rats fed raw soybean diets were larger than in controls, although there was no apparent difference in the zymogen content of the glands. There was a greater mean acinar cross section with a wider range for the test pancreas (6.4 mm) than for the control (4.3 mm). The acinar cells contained within a 64 cm^2 square were systematically counted from photomicrographs and revealed that the ratio of the number of acini in control versus test glands in the square was 1.9:1. The larger size of acinar epithelial cells in the test pancreas permitted fewer cells to be present in each 64 cm^2 square counted. The gland apparently enlarged because of hypertrophy of the acinar cells and not hyperplasia.

5406 THE HUMAN PARIETAL CELL BEFORE AND AFTER PENTAGASTRIN STIMULATION. A QUALITATIVE AND QUANTITATIVE ULTRASTRUCTURAL STUDY. (Fr.) Frexinos, J. (Purpan Hosp., Toulouse, France), M. Carballido, A. Louis and A. Ribet. *Arch. Fr. Mal. App. Dig.* 60(3, Suppl. 1): 57-70, 1971.

An ultrastructural study was made of parietal cells obtained by aspiration biopsy before and after administration of pentagastrin (6 μg/kg infused over 1 hr) to 15 subjects. After infusion of pentagastrin about 95% of the parietal cells showed marked increases in the number of microvilli and plasmalemmae on the apical and canalicular surfaces and decreases in the number of tubular vesicles which were located almost exclusively on the edges of the canaliculi. Many Golgi complexes were dilated and an increase occurred in the number of folds in the basal membrane. About 5% of the parietal cells were similar to those seen before administration of pentagastrin. Quantitative studies of parietal cells performed on 5 normal subjects confirmed that significant changes had occurred in the number of tubular vesicles and microvilli, but in 3 subjects no increases were found in the number of mitochondria or canaliculi and no decrease was found in the hyaloplasmic space.

5407 CELLULAR LOCALIZATION OF GROUP I PEPSINOGENS IN HUMAN GASTRIC MUCOSA BY IMMUNOFLUORESCENCE. (E.) Samloff, I. M. (Harbor Gen. Hosp., Torrance, Calif.). *Gastroenterology* 61(2):185-188, 1971.

Group I pepsinogens have been localized to granules in chief and mucous neck cells in human fundic mucosa. It was not possible to conclude that all group I pepsinogens are present in each cell type, since the antibody has been previously shown to react with group I pepsinogens. Specific fluorescence in fundic mucosa was limited to chief and mucous neck cells. Demonstration of fluorescent granules in mucous neck cells indicate they contain group I pepsinogens and further indicates the mucous neck cell is the precursor to the adult chief cell. It is unlikely that pepsinogens are synthesized elsewhere, then stored in the mucous neck cells. The finding that zymogen granules had a central unstained core in both chief and mucous neck cells was confirmed. Pyloric gland cells were consistently nonfluorescent indicating they do not contain group I pepsinogens.

5408 STUDY OF SOME ENDOCRINE CELLS FROM THE JUNCTION BETWEEN THE GLANDULAR AND NONGLANDULAR REGIONS OF THE STOMACH BY SILVER IMPREGNATION, FLUORESCENCE, AND ELECTRON MICROSCOPY. (Fr.) Lefranc, G. (Sch. Med., Nantes, France), A. L'Hermite, G. Pradal and J. Tusques. *C. R. Soc. Biol. (Paris)* 164(10):2121-2137, 1970.

In adult mice the epithelial side of the junction between the glandular and nonglandular stomach contained a large number of small cells which had a yellow fluorescence when stained with formaldehyde gas at 80° C. In contrast to mucosal mast cells which have been previously described, these cells were located within the glands and had staining properties similar to endocrine cells; these cells were argentaffinic but not argyrophilic. When mice were given L-dihydroxyphenylalanine (L-DOPA; 100 mg/kg i.p.), cells at the glandular edge of the junction developed a strong yellow fluorescence by taking up and decarboxylating L-DOPA. These cells, which are considered argyrophilic but not argentaffinic, belong to the group of enterochromaffin-like cells and were generally located inside the basal membrane of the gland and not in the lumen.

5409 PRONASE METHOD FOR ISOLATION OF VIABLE CELLS FROM NECTURUS GASTRIC MUCOSA. (E.) Blum, A. L., G. T. Shah, V. D. Wierbelhaus, F. T. Brennan, H. F. Helander, R. Ceballos and G. Sachs (U. Alabama Med. Ctr., Birmingham). *Gastroenterology* 61(2):189-200, 1971.

Viable cells of stripped Necturus gastric mucosa were prepared by incubation with 0.175% pronase solution in a shaking water bath. Intact isolated cells were round, oval or pear shaped; irregular cells were nonviable in viability tests. Four cell types were recognized: large (35-70 μ diameter) cells with dark cytoplasm and small granules, similar-sized cells with translucent cytoplasm and large and small granules, small (20-40 U diameter) cells with translucent cytoplasm and sparse granules and cells of similar shape which had on their surface rows of beating cilia. Cells with a positive succinic dehydrogenase stain (oxyntic cell identification) were rare in early cell collections but represented more than 30% of the cell population in late collections. In dye exclusion tests cell suspensions containing more than 30% of oxyntic cells were more than 90% viable. Oxygen consumption of cell suspensions was greater than that of stripped Necturus fundic mucosa. The water content of isolated cells was 80.2% of their wet weight and sodium and potassium concentrations in cell water were 44.2 and 66.6 mM, resp. The transmembranal potential of isolated cells was 44 mv, similar to that obtained for intact mucosa.

5410 EFFECT OF ASPIRIN AND RELATED COMPOUNDS ON THE FINE STRUCTURE OF MOUSE GASTRIC MUCOSA. (E.) Hingson, D. J. (U. California Med. Ctr., Los Angeles) and S. Ito. *Gastroenterology* 61(2):156-177, 1971.

Distinctively injured gastric surface mucous cells and damaged areas were found in all 22 mice following brief exposure to 20 mM aspirin solutions in 1, 10 or 100 mN HCl. Cellular pathology, which included cellular swelling and disruption, nuclear enlargement, and mottled-appearing cytoplasm, was detectable within 1 or 2 min of test solution administration. With the electron microscope reaggregation and redistribution of the nuclear chromatin were among the first indications of damage. Nuclear sap also became more coarsely aggregated. In the cytoplasm, ground substance density progressively decreased. Though the mucous granules were less uniformly clustered, they were not morphologically altered. Cytoplasmic vacuolization and plasmalemmal irregularities were also seen. However, cell junctions and most of the membranous organelles in the cytoplasm remained structurally intact during the early phase of injury. Within 10 min of exposure to the aspirin solution the damaged surface mucous cells lysed in situ were accompanied by denuded, underlying capillaries. The cellular and subcellular pathology following acetic, benzoic and salicylic acids closely resembled that produced by aspirin.

5411 STRUCTURE OF THE MUSCULARIS PROPRIA AT THE TRANSITION BETWEEN THE SMALL INTESTINE AND MECKEL'S DIVERTICULUM. (Ger.) Reck, W. (U. Mainz Anat. Inst., Germany). *Anat. Anz.* 128(3):285-287, 1971.

Layer analysis of longitudinal and circular fibers revealed 2 triangle shaped muscle gaps resulting from a rearrangement of the muscular structure in this area. These represent weak points in the intestinal wall and could be responsible for mucosal hernias at this site.

5412 MUSCULAR HYPERTROPHY AND HISTOCHEMISTRY OF NEURAL STRUCTURES IN ANTIPERISTALTIC SEGMENTS OF THE SMALL INTESTINE IN ANIMAL EXPERIMENTS. (Ger.) Hill, K. (Univ. Pathol. Inst., Mainz, Germany) and S. Hofmann. *Z. Gesamte Exp. Med.* 154(2):151-164, 1971.

The length of antiperistaltic segments of the lower ileum, 5 and 10 cm long, in dogs remained unchanged after 12 months, but a spindle-shaped dilatation of the intestine formed behind and in front of the proximal anastomosis and the thickness of the intestinal musculature increased in front of this anastomosis. Both longitudinal and circular muscles were hypertrophic after 1 month in all antiperistaltic segments. However, after 9-12 mo. hypertrophy was most pronounced in circular muscles in 5-cm segments and in longitudinal muscles in 10-cm segments. Histologic studies demonstrated that hypertrophy resulted from increases in the size of individual muscle cells. No changes were found in nerve structures in antiperistaltic segments.

5413 A COMPARISON OF THE MORPHOLOGY OF LIPID ABSORPTION IN THE JEJUNUM AND ILEUM OF THE ADULT RAT. (E.) Jersild, R. A., Jr. (Indiana U. Med. Ctr., Indianapolis) and R. T. Clayton. *Am. J. Anat.* 131(4):481-503, 1971.

Morphological aspects of lipid absorption were compared in the jejunum, mid- and terminal ileum after physiological fatty chyme was injected into ligated segments of each of the intestinal regions in fasting rats. In the mid-ileum, the absorptive pattern was similar to that in the jejunum. In cells along the distal portion of the villus, numerous fat droplets, 200-300 mμ in diameter, were present within membrane-bound profiles of endoplasmic reticulum. The cisternae of the Golgi apparatus were extensively dilated with droplets which showed evidence of coalescence. In the terminal ileum, following 30 min of exposure to chyme, absorbed cellular lipid was present primarily in the form of large, free matrix droplets. Droplets in the endoplasmic reticulum were smaller and fewer in number in this group. Transport of absorbed lipid is apparently considerably less in the terminal ileum. This morphological pattern appears to correlate with a reduced synthesis of triglycerides in the terminal ileum. Triglyceride synthesis and the formation of membrane-bound droplets are probably related events as they normally occur in the upper small intestine.

5414 CELL CONTACTS IN DUODENAL SMOOTH MUSCLE LAYERS. (E.) Henderson, R. M. (U. Alberta Dept. Pharmacol., Edmonton, Canada), G. Duchon and E. E. Daniel. *Am. J. Physiol.* 221(2):564-574, 1971.

Two types of cell contacts were described in canine duodenal smooth muscle, perfused in situ with glutaraldehyde fixative. The first was the 5-layered junction, 3 dense lines separated by 2 clear areas, with a total width of 210 A and was found only in the circular muscle. This nexus, therefore, cannot participate in electrical coupling in the longitudinal layer. A second type, occurring largely in the longitudinal layer but also in the circular, consisted of parallel running plasma membranes separated by an intercellular space approximately 500 Å wide. The cytoplasm under the membrane at such contacts was usually more dense than elsewhere; the center of the intercellular space was occupied by a denser line, often of granular appearance. Although cells were considerably more shrunken after a hypertonic perfusion, contacts of both types were unaltered. Also, after strong contraction of the muscle produced by acetylcholine or high levels of potassium in the perfusate, both types of junctions were still visible. Apparently these junctions are resistant to mechanical separation, and the observed uncoupling of slow waves in intestinal muscle under these conditions cannot be due simply to gross disruption of nexuses.

5415 SPIRALITY OF THE MUSCLE LAYERS OF THE INTESTINE. (E.) McKirdy, H. C. (U. Glasgow Inst. Physiol., Scotland) and J. Macmillan. *Experientia* 27(7):790, 1971.

The circular layer of the muscularis externis of the rabbit distal colon was examined by microdissection and by conventional histological methods. The circular layer consisted of quite distinct bundles which, in the distended intestine, were stacked like the leaves of a Venetian blind. These bundles lie at right angles to bundles of the longitudinal muscle layer. Each muscle bundle was composed of smooth muscle cells, all of which were aligned along the long axis of the bundle; nevertheless, there were irregular interconnecting strands of muscular tissue which linked contiguous bundles. When these interconnecting strands were broken, bundles of the circular muscle occasionally came away in intact rings; moreover, a circular muscle bundle could not be demonstrated to form more than one turn of a coil. Although, by virtue of the interconnecting strands, the circular layer may behave as a spiral in a functional sense, the bundles of circular muscle do not form part of an extensive helix in the structural sense.

5416 ULTRASTRUCTURAL MORPHOGENESIS OF COLONIC PAS-POSITIVE MACROPHAGES ("COLONIC HISTIOCYTOSIS"). (E.) Lou, T. Y. (Rhode Island Hosp., Providence), C. Teplitz and W. R. Thayer, Jr. *Hum. Pathol.* 2(3):421-439, 1971.

Serial sectioned rectal biopsies taken from 50 consecutive cases and reported as showing no definite pathologic changes were reviewed to determine if there was any "colonic histiocytosis". Colonic macrophages (histiocytes) were observed scattered or in small clusters in the lamina propria of 34 patients (68%). Compression, flattening, and actual rupture of the crypt with escape of mucus through the basement membrane into the contiguous lamina propria was observed. The goblet cells of the crypts revealing these changes showed ultrastructural degenerative alterations. These were characterized by marked pallor of the cytoplasmic matrix, conspicuous dilatation and disorganization of the rough endoplasmic reticulum with focal loss of attached ribosomes, and a decrease in glycogen. Actual rupture of the basement membrane accompanied by the presence of goblet cell contents extruded into the lamina propria was occasionally seen, with macrophages being in direct contiguity with the extracellular material. Cells containing many membrane-bound accumulations of mucin-like material without identifiable lysosomes, but with other intact normal organelles, were considered to represent "end-stage" degranulated macrophages.

5417 IMMUNOHISTOCHEMICAL LOCALIZATION OF AMYLASE, LYSOZYME AND IMMUNOGLOBULINS IN THE HUMAN PAROTID GLAND. (E.) Kraus, F. W. (U. Alabama Inst. Dent. Res., Birmingham) and J. Mestecky. *Arch. Oral Biol.* 16(7):781-789, 1971.

Amylase, lysozyme, and immunoglobulins in the human parotid gland were localized by employing the fluorescent antibody technique. The specific fluorescence of anti-amylase is seen best in the cells of the acini and is also seen, to a lesser degree, in the proximal cells of the intercalated ducts. The lysozyme fluorescent antibody is only apparent in certain cells of striated ducts, i.e. those at the base of the ducts. Fluorescent antisera specific for immunoglobulin IgG was not observed in any cells, but IgM was localized widely throughout the stroma. IgA was found to be mainly in interstitial cells clustered around striated ducts and having the characteristics of plasma cells. Some IgA was also found in the apical portions of striated duct cells. Amylase and lysozyme each occurred in only 1 cell type whereas IgA occurred in 2 fundamentally different cell types.

5418 PREPARATIVE THIN LAYER CHROMATOGRAPHY FOR THE SEPARATION OF THE VARIOUS FORMS OF VITAMIN B6 IN TISSUES. VITAMIN B6 CONTENT OF CHICK EMBRYO LIVER DURING THE MIDPERIOD OF DEVELOPMENT. (E.) Smith, M. A. (U. Miami Sch. Med., Fla.) and L. S. Dietrich. *Biochim. Biophys. Acta* 230(2):262-270, 1971.

5419 AGE-DEPENDENT CHARACTERISTICS OF CONTRACTILE PROTEIN FROM LIVER MITOCHONDRIA OF ALBINO RATS. (Rus.) Razumovich, A. N. and T. G. Lastovskaia. *Biokhimiia* 36(1): 53-59, 1971.

5420 FEATURES SPECIFIC TO PARASYMPATHETIC INNERVATION OF THE STOMACH. (Rus.) Poliak, R. I. (Stavropol Med. Inst., USSR), V. V. Gresev and A. A. Fisher. *Biull. Eksper. Biol. Med.* 71(4):27-30, 1971.

5421 MITOCHONDRIAL AUTONOMY. STUDIES ON THE MITOCHONDRIAL GLYCOPROTEIN: GLUCOSYL AND MITOCHONDRIAL GLYCOPROTEIN: MANNOSYL TRANSFERASE ENZYME SYSTEMS OF RAT LIVER MITOCHONDRIA UTILIZING ENDOGENOUS ACCEPTORS. (E.) Martin, S. S. (U. Rochester Sch. Med., N. Y.) and H. B. Bosmann. *Biochim. Biophys. Acta* 230(2): 411-422, 1971.

5422 ULTRASTRUCTURE OF ACINAR CELL OF RAT PANCREAS DURING STARVATION. (Sl.) Kapeller, K. (U. Komenskeho Dept. Med., Bratislava, Czechoslovakia), M. Mikulajova and A. Bucko. *Bratisl. Lek. Listy* 55(2):70-79, 1971.

5423 MICROSOME LOCALIZATION OF THE SYNTHESIS OF FATTY ACIDS IN THE LIVER OF MICE IN VIVO. (Fr.) Favarger, P. (Univ. Dept. Biochem. Med., Geneva, Switzerland) and J. Gerlach. *FEBS Lett.* 13(5):285-289, 1971.

5424 ISOLATION OF RAT LIVER FATTY ACID SYNTHETASE FROM MICROSOMAL FRACTION. (Fr.) Rous, S. (U. Geneva Dept. Biochem. Med., Switzerland) and L. Aubry. *FEBS Lett.* 13(5): 282-284, 1971.

5425 FINE STRUCTURE OF THE DEVELOPING GASTRIC EPITHELIUM OF THE CHICK. (E.) Overton, J. (Univ. Chicago Whitman Lab., Ill.). *J. Morphol.* 133(4):375-386, 1971.

5426 THE FINE VENOUS ARCHITECTURE OF THE ESOPHAGOGASTRIC TRANSITION ZONE IN DOGS. (Por.) Ferraz De Carvalho, C. A. (U. Sao Paulo Sch. Med., Brazil), I. Fujimuha, E. M. C. Tolosa and P. C. Piantino Lemos. *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 25(6):337-344, 1970.

5427 ELECTRON MICROSCOPE STUDIES ON THE ENDOCRINE CELLS OF THE HUMAN GASTRIC FUNDUS. (E.) Kobayashi, S. (Univ. Sch. Med., Niigata, Japan), T. Fujita and T. Sasagawa. *Arch. Histol. Jap.* 32(5):429-444, 1971.

5428 THE LENGTH AND MUCOSAL SURFACE AREA OF THE SMALL AND LARGE GUT IN YOUNG RATS. (E.) Permezel, N. C. (Univ. Western Ontario Dept. Biochem., London, Canada) and D. D. A. Webling. *J. Anat.* 108(2):295-296, 1971.

5429 UNDERNUTRITION IN THE NEONATE: LONG TERM EFFECTS UPON MITOCHONDRIAL AND MICROSOMAL CONSTITUENTS OF THE RAT HEPATOCYTE. (E.) Dallman, P. R. (Univ. California Dept. Pediatr., San Francisco). *J. Nutr.* 101(5): 669-676, 1971.

5430 HISTOLOGICAL AND HISTOCHEMICAL FINDINGS IN EXPERIMENTAL LEAD ENTEROPATHY. (It.) Di Nunno, C. (U. Bari Inst. Leg. Med., Italy), N. L'Abbate and L. Strada. *Lav. Umano* 22(8):360-374, 1970.

5431 A METHOD FOR PREPARING CHROMOSOMES OF HEPATOCYTES. (Rus.) Urivaeva, I. V. (Inst. Develop. Biol., Moscow) and V. M. Faktor. *Tsitologiia* 13(4):530-532, 1971.

5432 THE FORMATION OF MICROVILLI IN THE FETAL RAT SMALL INTESTINE. (Ger.) Vollrath, L. (Univ. Anat. Inst., Wurzburg, Germany). *Z. Zellforsch. Mikrosk. Anat.* 114(4): 546-556, 1971.

5433 SOME RECENT CONTRIBUTIONS OF ANATOMY TO THE PHYSIOLOGY OF THE GASTROINTESTINAL TRACT. (E.) Wyburn, G. M. (U. Glasgow Dept. Anat., Scotland). *R. C. Rom. Gastroenterol.* 3(1):47-57, 1971.

See also numbers: 5437, 5555, 5602, 5606, 5924, 5925, 5926, 6076, 6140, 6150, 6152, 6163, 6169

5434 PERMEABILITY OF THE HUMAN GASTRIC MUCOSA. ALTERATION BY ACETYLSALICYLIC ACID AND ETHANOL. (E.) Smith, B. M., J. J. Skillman (Harvard Med. Sch., Boston, Mass.), B. G. Edwards and W. Silen. *N. Engl. J. Med.* 285(13):716-721, 1971.

After the administration of acetylsalicylic acid or ethanol, changes in gastric mucosal permeability to hydrogen ion were studied in 10 healthy subjects by using lithium as a marker, since Li^+ concentration is not subject to changes caused by secretion or neutralization. The mean change in the ratio of lithium to polyethylene glycol (part of a gastric wash solution) was more negative during acetylsalicylic acid and ethanol periods in comparison to base line periods. The mean change in the ratio of hydrogen ion to polyethylene glycol (Δ H^+/PEG) decreased from a positive base line value to a negative value for the acid periods but was not different for ethanol periods. There were also significant decreases in transmural gastric mucosal potential difference following the administration of either of the tested agents, supporting the conclusion that these substances increase mucosal permeability. These data suggest a possible mechanism for the gastrointestinal blood loss that has been shown to be a result of ingestion of these agents in man.

5435 EXPERIMENTAL ACHYLIA GASTRICA AND IRON ABSORPTION. (E.) Murray, M. J. (U. Minnesota Med. Sch., Minneapolis) and N. Stein. *Br. J. Haematol.* 21(1):113-120, 1971.

The effect of gastric acid and other gastric components on iron absorption in X-ray induced achylic gastric mucosa was studied in mature female rats. Neutralized and synthetic gastric juice increased iron absorption 2-fold. While hydrochloric acid did not affect the capacity of the achylic stomach to absorb iron, neutralized, synthetic, and human pernicious anemia gastric juice did improve the absorptive defect, the effect being optimal with the addition of rat or human gastric juice. Intrinsic factor had no effect on absorption compared with controls, whereas antigastric mucosal serum markedly suppressed iron absorption. Thus, defective iron absorption in achylia gastrica may be the result of antibodies (formed to proteins of injured gastric mucosal cells) forming large complexes with iron entering the stomach, which are subsequently poorly absorbed.

5436 BILE DAMAGE TO THE GASTRIC MUCOSAL BARRIER: THE INFLUENCE OF pH AND BILE ACID CONCENTRATION. (E.) Black, R. B. (Roy. Infirm., Cardiff, Wales), D. Hole and J. Rhodes. *Gastroenterology* 61(2):178-184, 1971.

The effect of changes in pH and concentration of human bile on the gastric mucosa was studied in 3 dogs with Heidenhain pouches by measuring transmucosal potential differences and net fluxes of Na^+ and H^+ ions before, during, and after exposure to bile. Bile markedly lowered the transmucosal potential difference, its effects being greatest at high concentrations; however, alterations in pH were without effect. High bile concentrations increased H^+ diffusion from the pouch, the effect being greatest at pH 2 and least at pH 8. The degree of Na^+ influx into the pouch was comparable to H^+ efflux with respect to bile concentration, but was not affected by pH. No increase in fluid volume was associated with the increased Na^+ output. Bile seemingly alters ion diffusion characteristics of the gastric mucosa rather than an increase in nonparietal secretion.

5437 THE EFFECT OF NEOMYCIN ON THE ABSORPTION OF GLUCOSE FROM THE SMALL INTESTINE AND ON THE MORPHOLOGY OF THE INTESTINAL MUCOSA IN INFANT AND ADULT RATS IN VITRO. (E.) Waitzová, D. (Charles U. Sch. Med. Pilsen, Czechoslovakia), K. Kubát, M. Melicharová and O. Koldovský. *Physiol. Bohemoslov.* 20(1):11-18, 1971.

In adult rats, the addition of 5% neomycin to the medium on the mucosal side of the everted sac caused a decrease in glucose absorption in the jejunum whereas a 1% concentration was without significant effect. In 10-day-old fasted (42 hr) rats, a significant inhibition of glucose transport was observed in the jejunum and ileum following 1% neomycin administration. However, in nonfasted rats only jejunal glucose absorption was decreased by the addition of 1% neomycin to the medium. The administration of 0.1% neomycin had no significant effect on glucose transport. In nonfasting control rats, enterocytes of the epithelial surface layers were characterized by the formation of large vacuoles in the infranuclear cytoplasm, displacing the nucleus to the base of the cell, and marked infiltration of the mucosal stroma. The degree of vacuolation of the enterocytes and of edematous infiltration of the mucosal stroma was significantly decreased by the administration of 5% neomycin to adult rat intestine and 1% neomycin to 10-day-old rat intestine.

5438 ULTRASTRUCTURE OF THE DUODENAL MUCOSA OF MICE WITH A HEREDITARY DEFECT IN IRON ABSORPTION. (E.) Bédard, Y. C. (U. Toronto Dept. Pathol., Ontario, Canada), P. H. Pinkerton and G. T. Simon. *J. Pathol.* 104(1):45-51, 1971.

The ultrastructural appearance of the duodenal mucosa was studied in hemizygous male (sla/-) mice with X-linked anemia and in heterozygous female (sla/+) animals. In hemizygous mice no structural changes were observed in goblet, argentaffin, paneth or undifferentiated cells or in the muscular layer of the serosa. Dark inclusion bodies which contained dense ferritin granules were concentrated in the supranuclear portion of the absorptive cells of the distal and middle thirds of the duodenal villi. Near the ferritin-containing vacuoles, the smooth endoplasmic reticulum (ER) was conspicuous with an increased number of vesicles, while the rough ER was decreased. In the lamina propria, the macrophages were increased in number, particularly under the basement membrane and around the capillaries, and they had a variety of inclusions including lipids, granular material with crystalloid structures and bodies with myelin-like figures resembling degenerating mitochondria. Similar changes were observed in heterozygous mice. When oral iron supplements were given to normal mice similar duodenal changes were seen. The observed changes in the absorptive cells of the duodenum in anemic (sla/-), heterozygous (sla/+) and iron-supplemented mice seemingly represents a reaction of these cells to iron deposition.

5439 THE EFFECT OF EDTA ON THE ELECTRICAL ACTIVITY OF RAT JEJUNUM. (E.)

Hardcastle, P. T. (Univ. Dept. Physiol., Sheffield, England) and J. Eggenton. *Biochim. Biophys. Acta.* 241(3):930-933, 1971.

Alteration in electrical activity of everted sacs of rat jejunum was studied using ethylenediaminetetraacetic acid (EDTA). EDTA (5 mm) added to the mucosal fluid caused a transient increase in the potential difference across the jejunum which lasted 2-3 min and was followed by a gradual fall in the potential. The initial increase in potential difference was not the result of increased passive resistance of the jejunum and indicated that the change in potential was due to current generated by the tissue. Lack of calcium markedly decreased the stimulation of potential caused by EDTA and enhanced the subsequent decrease in potential. $CaCl_2$ (5 mM) added to the mucosal fluid before EDTA prevented this fall in potential. Magnesium had no apparent effect on either aspect of EDTA response. Lowering the sodium gradient across the mucosal membrane as well as treatment with ouabain decreased the stimulation of potential caused by EDTA. EDTA seems to increase the permeability of rat jejunum by removing bound calcium resulting in higher intracellular sodium. This might stimulate the sodium pump and increase potential. Further exposure to EDTA would result in sodium leakage back to the mucosal fluid acting as a shunt to short-circuit the potential.

5440 FOLIC ACID ABSORPTION IN MAN: ENHANCING EFFECT OF GLUCOSE. (E.)

Gerson, C. D. (Mt. Sinai Sch. Med., New York, N. Y.), N. Cohen, G. W. Hepner, N. Brown, V. Herbert and H. D. Janowitz. *Gastroenterology* 61(2):224-227, 1971.

The absorption of tritiated pteroylglutamic acid (folic acid) in saline in the human jejunum was evaluated, following the addition of glucose, with the use of a triple lumen tube perfusion system. Perfusion studies in 11 subjects with isotonic saline resulted in a mean tritiated pteroylglutamic acid absorption of 15.5%. The addition of glucose to the perfusion media in 10 subjects resulted in a significant rise (39.2%) in absorption despite a lower intraluminal sodium concentration. Water and sodium absorption also rose significantly. There was an inverse relationship of water absorption to flow rate so that the more water absorbed, the slower the flow rate. Thus, flow rate was significantly lower with the glucose solution. Glucose increased folic acid absorption, perhaps by enhancement of an active transport process, folic acid sharing a common transport carrier system with sodium and glucose.

5441 INTESTINAL FOLATE ABSORPTION. I. 5-METHYLTETRAHYDROFOLIC ACID. (E.)

Strum, W. (Seymour Johnson AFB, N. C.), P. F. Nixon, J. B. Bertino and H. J. Binder. *J. Clin. Invest.* 50(9):1910-1916, 1971.

Intestinal absorption of 5-methyltetrahydrofolic acid (the principal dietary and circulating folate compound) was studied in the rat with the use of a synthetic physiologically active radiolabeled diastereoisomer of this acid. When everted jejunal sacs were incubated in mucosal media containing the above tritiated compound, the radiolabels were recovered unchanged from the serosal media after 60 min of incubation. Accumulation against a concentration gradient was not observed in duodenal, jejunal or ileal segments at 5-methyl-tetrahydrofolic acid concentrations from 0.5 to 500 nmoles/liter. Unidirectional transmural flux determination also did not indicate a significant net flux. Transfer of the folate compound from mucosa to serosa at 0.05-50.0 μmoles/liter was quantitatively similar in everted sacs of duodenum, jejunum and ileum and increased in a linear fashion with increased initial mucosal concentrations. Mucosal to serosal transfer was unimpaired in the presence of anaerobic conditions, a sodium-free medium, 10^{-4} M dinitrophenol or methotrexate. Apparently 5-methyltetrafolic acid is not absorbed by a carrier mediated system but by diffusion.

5442 CONTRACTION OF VILLI AND FLUID TRANSPORT IN DOG JEJUNAL MUCOSA IN VITRO. (E.)

Lee, J. S. (U. Minnesota Med. Sch., Minneapolis). *Am. J. Physiol.* 221(2):488-495, 1971.

The relationship between villus contraction and fluid transport of isolated canine jejunal mucosal membrane was studied in an in vitro preparation permitting simultaneous determination of both. Fluid transport was always reduced or completely inhibited when the villi were in the contracted state. Glucose, sodium and potassium were all indispensable for producing a maximum rate of fluid transport, as their absence from bathing Ringer solutions was associated with a negligible or markedly reduced fluid transport rate and a sustained villus shortening. This contracting and reduced transport rate was also seen in the presence of atropine sulfate, ouabain, phlorhizin, 2,4-dinitrophenol or NaCN, in hypertonic Ringer solution or at low temperatures. Epithelial sloughing always accompanied vigorous villus contraction. In Ca-free Ringer solution, the fluid transport rate was reduced, but villi showed no change in length or width, although the epithelial layer was loosened and easily removed by agitation. Over a wide range of pH (6.4-8.2) neither parameter changed. Glucose, sodium, potassium or calcium may play a role in preventing villus contraction and thereby maintaining the structural integrity of the villi necessary for a normal rate of fluid transport.

5443 ABSORPTION OF GLUCOSE AND GALACTOSE FROM THE SMALL INTESTINE OF HYPOPHYSECTOMIZED RATS. (E.) Havivi, E. and R. Levitan (VA West Side Hosp., Chicago, Ill.). *Am. J. Dig. Dis.* 16(4):299-305, 1971.

In studies of the effect of hypophysectomy on the transport of glucose and galactose from the small intestine of rats 31-34 days of age, the uptake of glucose and galactose was found to be enhanced 5 days after hypophysectomy in both in vivo (jejunal loops) and in vitro (intestinal rings) experiments. This uptake of glucose, however, returned to normal 11 days after hypophysectomy. Glucose uptake in vitro was highest in the area of jejunum 20 - 30 cm from the pylorus, and lowest in the lower ileum. Intestinal rings from the hypophysectomized rats were found to convert glucose-1-^{14}C to $^{14}CO_2$ at a greater rate than control rats 5 days after surgery. Glucose and galactose absorption from the jejunum is seemingly enhanced soon after hypophysectomy.

5444 PRESSURES OF O_2 AND CO_2 IN THE INTESTINAL EPITHELIUM OF THE RAT DURING IN VIVO ABSORPTION EXPERIMENTS. EFFECTS OF HYPEROXIA AND HYPERCAPNIA. (Fr.) Maggi, P. (Michel Pacha Inst., Tamaris-sur-Mer, France), F. Brue, B. Froussolle, E. Bensimon and G. Pérès. *C. R. Soc. Biol. (Paris)* 164(11):2285-2287, 1970.

During the absorption of an isotonic glucose solution the O_2 pressure in the intestinal epithelium of rats breathing normal air was relatively low and far from the optimum value for active glucose transport. Under these conditions the apical pole of epithelial cells was only slightly oxygenated and was in contact with an hypoxic medium. Inhalation of pure O_2 increased O_2 pressures in the mesenteric vein and intestinal lumen while synthesis of lactic acid decreased; the rate of glucose absorption increased under these conditions. With hypercapnia, O_2 pressures in the intestine reached values as high as those obtained with hyperoxia, but the pressure of CO_2 increased and inhibited intestinal absorption of glucose. The inhibitory effect of CO_2 on glucose absorption was reduced when rats breathed a mixture of 90% O_2 and 10% CO_2.

5445 HYPEROXIA, HYPERCAPNIA, AND INTESTINAL ABSORPTION OF SUGARS IN VIVO IN THE RAT. (Fr.) Maggi, P. (Michel Pacha Inst., Tamaris-sur-Mer, France), F. Brue and G. Pérès. *C. R. Soc. Biol. (Paris)* 164(11):2282-2284, 1970.

The effects of breathing large quantities of O_2 (90 and 100%) and CO_2 (10 and 20%) on intestinal absorption of D-glucose, D-galactose, and L-arabinose were studied in adult rats. The absorption of D-glucose and D-galactose, which are actively transported through the intestine, was increased by hyperoxia and decreased by hypercapnia. Hyperoxia and hypercapnia had no effect on D-glucose absorption in the presence of phlorhizin (10^{-3}M). These results indicate that under physiological conditions the pressure of O_2 in the intestinal epithelium is lower than the pressure which would assure maximum absorption of these sugars. Hyperoxia and hypercapnia had no effect on the rate of absorption of L-arabinose which is transported passively and in small quantities.

5446 EXTRACORPOREAL PERFUSION OF THE JEJUNUM IN THE DOG. THE LYMPHATIC SYSTEM AND ^{14}C-D-GLUCOSE ABSORPTION. (Fr.) Mendel, C. (Civil Hosp., Strasbourg, France), V. Botescu, J. Katchelhoffer and J. F. Grenier. *C. R. Soc. Biol. (Paris)* 164(10):2134-2137, 1970.

Ligation of lymphatic vessels in isolated dog jejunum had no effect on the quantity of D-glucose absorbed by the intestine during extracorporeal perfusion but increased the venous blood levels of D-glucose from 19.8% to 48.2%. These findings suggest that anastomoses between lymphatics and veins in the small intestine are involved in transporting glucose through the intestine and into the blood.

5447 THE NATURE OF THE INTESTINAL EPITHELIAL BARRIER. (E.) Tidball, C. S. (George Washington Med. Ctr., Washington, D. C.). *Am. J. Dig. Dis.* 16(8):745-767, 1971.

This progress report on the nature of the intestinal epithelial barrier first reviews electron microscopic studies on the structure of the barrier which focus on the enteric surface coat, the junctional complex, the lateral border space, the basal lamina and endothelial cell junctions. The basis for measurement of membrane permeability and pertinent estimates on various tissues were next discussed. The role of metallic ions in the alkaline earth series on cell to cell attachments and tissue permeability, (particularly the mechanism of chelation depletion effect) was presented as were structural or permeability assessments that have been made in diseases like ulcerative colitis, cholera, sprue and kwashiorkor.

5448 MEASUREMENT OF ORAL CALCIUM ABSORPTION FROM THE GUT BY EXTERNAL ISOTOPE COUNTING. (E.) Macleod, M. A. *J. R. Nav. Med. Serv.* 57(2):88-91, 1971.

After background counting of the forearms, control subjects received 1 μC ^{47}CaCl$_2$ in 1 ml saline i.v. The forearm was subjected to scintillation counting again 24 hr later for a period of 100 seconds after which each subject drank 10 μC of ^{47}CaCl$_2$ in 100 mg calcium gluconate solution made up to 100 ml with water. Counting was performed at 26 and again at 50 hr after this p.o. dose, allowing 2 hr for intestinal absorption and 24 hr for the label to reach equilibrium in the tissues, bone and blood. Studies in these normal subjects showed intestinal calcium absorption to be 25-32% (mean 28.5%). In patients with altered levels, measurement of calcium absorption was 70% in urolithiasis, 59% in iatrogenic hypercalciuria, 52% in idiopathic hypercalciuria, and 18% in hypoparathyroidism.

5449 EFFECT OF SOME SURFACTANTS ON GASTROINTESTINAL ABSORPTION OF ACETYLSALICYLIC ACID. (Fr.) Cid, E. (U. Liege Inst. Pharm., Belgium), A. Dresse and F. Jaminet. *Pharm. Acta Helv.* 46(6):377-382, 1971.

Acetylsalicylic acid (40 mg/kg) and the surfactants polysorbate 80, sodium lauryl sulfate, or cetrimonnium bromide (10 and 50 mg/kg) were administered simultaneously through a stomach tube to female Wistar rats. At a dose of 10 mg/kg, none of the surfactants had any effect on absorption of acetylsalicylic acid. At a dose of 50 mg/kg polysorbate 80 and, to a lesser extent, sodium lauryl sulfate increased absorption while cetrimmonium bromide inhibited it. When surfactants (10 mg/kg/day) were administered for 15 days prior to administration of acetylsalicylic acid, polysorbate 80 had no effect on absorption of acetylsalicylic acid while sodium lauryl sulfate and cetrimmonium bromide increased its absorption, probably because they produced lesions in the gastric mucosa.

5450 MICROPUNCTURE STUDY OF EXCRETION OF WATER AND ELECTROLYTES BY THE PANCREAS. (E.) Mangos, J. A. (U. Wisconsin Med. Sch., Madison) and N. R. McSherry. *Am. J. Physiol.* 221(2):413-420, 1971.

Micropuncture and microanalytical techniques were used for the determination of sodium, potassium and chloride concentrations in the primary secretory (acinar) fluid of rabbit and rat pancreas. Transductal fluxes of monovalent ions and water were also studied. In the rabbit, the acinar fluid contained Na in concentrations higher than in the rat. The directly measured mean Cl concentration of 42.9 mEq/liter was significantly lower than that (113.5) of the rat acinar fluid, while the indirectly determined (retrograde duct perfusion with polylysine) bicarbonate concentration of 111.4 mEq/liter was higher than that of the rat acinar fluid (37.8). Simultaneous measurements of the above ion concentrations in acinar fluid and in the final pancreatic juice showed that there were no net transductal fluxes of Na and K in the pancreas of both species. For the rat pancreatic influx of HCO$_3$ and efflux of Cl occurred; whereas, in the rabbit pancreas influx of Cl and efflux of HCO$_3$ were observed. These opposing anionic transductal fluxes in the pancreas of 2 species of rodents are similar to those observed between the human pancreas and the pancreas of the dog and cat.

5451 COMPETITION BY UNCONJUGATED AND CONJUGATED SULFOBROMOPHTHALEIN SODIUM (BSP) FOR TRANSPORT INTO BILE. EVIDENCE FOR A SINGLE EXCRETORY SYSTEM. (E.) Whelan, G. and B. Combes (U. Texas Southwestern Med. Sch., Dallas). *J. Lab. Clin. Med.* 78(2):230-244, 1971.

The hepatic disposition of infused conjugated sulfobromophthalein (BSP[C]) and unconjugated BSP (BSP[U]) was studied in guinea pigs and rats. The maximal rate of dye excretion into the bile was much higher when BSP[C] rather than BSP[U] was administered to both guinea pigs and rats. Only BSP[C] was found in the liver with infusions of BSP[C], whereas both BSP[C] and BSP[U] were found in the liver of animals infused with BSP[U]. When both BSP[C] and BSP[U] were present in the liver the transport of BSP[C] was markedly depressed in both rats and guinea pigs. When competition studies were performed in the guinea pig, the rate of BSP[C] excretion into the bile established during infusions of BSP[C] alone was markedly depressed when BSP[U] was added to the infusion, and the decrease in the rate of excretion of BSP[C] was greater than the excretion rate of BSP[U] appearing in the bile. BSP[U] may interfere with the transport of BSP[C] from liver cells into bile.

5452 COMPETITIVE INTERACTIONS BETWEEN L-ALANINE AND L-PHENYLALANINE IN RABBIT ILEUM. (E.) Schultz, S. G. (U. Pittsburgh Sch. Med., Pa.) and L. Markscheid-Kaspi. *Biochim. Biophys. Acta* 241(3):857-860, 1971.

Unidirectional influxes of L-alanine and L-phenylalanine were examined for their competitive interactions across the brush border of rabbit ileum. The effects of varying concentrations of phenylalanine on the influx of alanine and the effects of varying concentrations of alanine on the influx of phenylalanine were linear relations of both the unidirectional influx of the amino acid divided by the influx of the amino acid in the presence of the competing amino acid and the concentration of the competing amino acid. For both phenylalanine and alanine the calculated inhibitor constant was almost twice (2.1 and 2.4, resp.) the directly measured concentrations needed to elicit half-maximal influxes of phenylalanine and alanine. Therefore, alanine and phenylalanine seem to be mediated by 2 different mechanisms which do not differ with respect to their kinetics to bind either of these 2 amino acids. However, the binding of one amino acid with the other's influx mechanism is non-productive so far as the resulting complexes are incapable of translocation across the brush border.

5453 THE ESTIMATION OF INTRINSIC FACTOR USING GUINEA-PIG INTESTINAL BRUSH BORDERS. (E.) Schjönsby, H. (Haukeland Hosp., Bergen, Norway) and T. J. Peters. *Scand. J. Gastroenterol.* 6(5):441-447, 1971.

The effect of intrinsic factors (IF) on vitamin B_{12} uptake by isolated brush borders from the distal half of the guinea-pig small intestine was studied. Human gastric juice (HGJ) markedly increased the uptake of $^{57}CoB_{12}$ both by distal intestine homogenates and brush borders, being much higher in the latter. The uptake of HGJ was highest in the more distal intestinal segments. The uptake of HGJ-bound $^{57}CoB_{12}$ was lower when distal brush borders were incubated at pH 7.4 than at pH 5.6, was decreased when calcium and magnesium ions were replaced by an equimolar quantity of NaCl, and when ethylenediaminetetraacetic acid was added in a sufficient amount to bind all divalent cations present in the buffer. IF preparations from man, guinea pig and rat enhanced the uptake of $^{57}CoB_{12}$ by distal brush borders. The IF activity was almost completely abolished when HGJ was heated to 100° for 5 min. Blocking and binding IF antibodies markedly reduced the uptake of human gastric juice bound $^{57}CoB_{12}$. Brush borders seemingly provide a more sensitive system for estimating IF activity than whole mucosal homogenates.

5454 DECREASED JEJUNAL UPTAKE OF LABELLED FOLIC ACID (^{3}H-PGA) IN ALCOHOLIC PATIENTS: ROLES OF ALCOHOL AND NUTRITION. (E.) Halsted, C. H. (Baltimore City Hosps., Md.), E. A. Robles and E. Mezey. *N. Engl. J. Med.* 285(13):701-706, 1971.

The amount of perfused labeled folic acid (triple lumen tube) taken up by the jejunal segment in 8 chronic alcoholics with a history of poor diet was low (20.4%) compared with the uptake in 3 patients on an adequate diet (38.2%). The value for jejunal uptake in the abstinent group was 36.5% and a similar value was obtained in the group subsequently given ethanol in the hospital. Abstinence and hospital diet were followed, in each of 5 patients, by improvement in the jejunal uptake of labeled folic acid. Absorption of folic acid is decreased in malnourished, actively drinking alcoholics. The functional defect is apparently caused by poor nutrition rather than a toxic effect of ethanol on the jejunum.

5455 THE KINETICS OF INCORPORATION OF PROTEIN INTO THE LIVER PLASMA MEMBRANE. (E.) Barancik, L. C. (U. Pittsburgh Sch. Med., Pa.) and I. Lieberman. *Biochem. Biophys. Res. Commun.* 44(5):1084-1088, 1971.

5456 TRANSPORT OF CHLORIDE IN THE SMALL INTESTINE OF Rana esculenta. (It.) Bianchi, A. (Univ. Milan Inst. Gen. Physiol., Italy), B. Giordana and F. Repetto. *Boll. Soc. Ital. Biol. Sper.* 46(23):989-990, 1970.

5457 INTESTINAL MUCOSAL LACTEAL IN TRANSPORT OF MACROMOLECULES AND CHYLOMICRONS. (E.) Dobbins, W. O., III. (VA Hosp., Washington, D. C.). *Am. J. Clin. Nutr.* 24(1):77-90, 1971.

5458 STIMULATION OF INTESTINAL SODIUM ABSORPTION BY SUGARS. (E.) Fordtran, J. S. (U. Texas Southwest. Med. Sch., Dallas) and F. C. Rector, Jr. *Am. J. Clin. Nutr.* 24(5):503-504, 1971.

5459 STUDIES ON THE REATTACHMENT OF RIBOSOMES AND RIBOSOMAL SUBUNITS TO RIBOSOME FREE MEMBRANES PREPARED FROM RAT LIVER MICROSOMES BY MEANS OF LITHIUM CHLORIDE. (E.) Scott Burden, T. (U. Rhodesia Dept. Biochem., Salisbury, Rhodesia) and A. O. Hawtrey. *Hoppe Seylers Z. Physiol. Chem.* 352(4):575-582, 1971.

5460 LACK OF PERMEATION OF NAD INTO LIVER CELLS. (Ger.) Liersch, M. (Univ. Inst. Biochem., Freiburg/Br., Germany), H. Groteluschen and K. Decker. *Hoppe Seylers Z. Physiol. Chem.* 352(2):267-274, 1971.

5461 ABSORPTION OF VITAMINS FROM THE LARGE INTESTINE IN VIVO. (E.) Sorrell, M. F. (New Jersey Coll. Med. Dent., Jersey City), O. Frank and A. D. Thomson. *Nutr. Rep. Int.* 3(3):143-148, 1971.

5462 WATER ABSORPTION AND SWELLING IN THE RAT SMALL INTESTINE INCUBATED IN VITRO. (It.) Esposito, G. (U. Kentucky Dept. Pharmacol., Lexington, Ky.) and T. Z. Csaky. *Boll. Soc. Ital. Biol. Sper.* 46(23):980-984, 1970.

5463 DISTINCTION BETWEEN GALACTOSE AND PHENYLALANINE EFFECTS ON ALANINE

TRANSPORT IN RABBIT ILEUM. (E.) Frizzell, R. A. (U. Pittsburgh Sch. Med., Pa.) and S. G. Schultz. *Biochim. Biophys. Acta* 233(2):485-488, 1971.

5464 NUCLEAR MAGNETIC RESONANCE STUDIES OF MANGANESE BINDING OF RAT LIVER ARGINASE. (E.) Hirsch Kolb, H. (Univ. California Sch. Med., San Francisco), H. J. Kolb and D. M. Greenberg. *J. Biol. Chem.* 246(2):395-401, 1971.

5465 PHYSIOLOGY OF DIGESTION AND INTESTINAL ABSORPTION. (Fr.) Jos, J. (Hosp. Infant. Dis., Paris). *Rev. Pediatr.* 7(3):193-205, 1971.

See also numbers: 5413, 5603, 5609, 5833, 5893, 5927, 6186, 6217

5466 MANOMETRIC CONFIGURATION OF THE LOWER ESOPHAGEAL SPHINCTER IN NORMAL HUMAN SUBJECTS. (E.) Kaye, M. D. (U. Colorado Med. Ctr., Denver) and J. P. Showalter. *Gastroenterology* 61(2):213-223, 1971.

In 15 young human subjects the manometric tracing of the lower esophagus sphincter from a perfused side-opening catheter was markedly influenced by the spatial orientation of the recording opening with the lower esophageal high pressure zone. On numerous withdrawal tracings, both during quiet respiration and with the breath held, invariably there were differences between the simultaneous recordings from 3 catheters whose openings were located at identical levels. Differences were observed in absolute pressures, in the levels at which changes in pressures occurred and in the point of respiratory reversal. For a given lead, and irrespective of the transducer through which a tracing was obtained, there were differences between the pressure profiles recorded on successive withdrawals through the high pressure zone indicating that false conclusions may be drawn from comparisons of pressure profiles. Also, suggesting unreliability of certain manometric criteria, many of the manometric features for the diagnosis of hiatal hernia e.g. double respiratory reversal, were observed frequently in this group of normal subjects.

5467 PHARMACOLOGICAL RECEPTORS IN THE RAT STOMACH FUNDUS. CONSIDERATIONS ON THE THERMAL ALTERATION. (E.) Vaccari, A. (Univ. Inst. Pharmacol., Genoa, Italy). *Pharmacology* 5(6):321-330, 1971.

A study on rat stomach fundal strips differentiated between 2 groups of drugs based on the heat stability of their receptor sites. The method employed was somewhat unspecific in that the cell membrane was also slightly affected by heat as shown by the transient inhibition of electrically induced muscular contraction by occasional modifications of the muscular electrical activity and by the slowly reversible blockade of KCl^- provoked contractions. Heat-labile receptors (or protein receptors) are suggested for dexamphetamine, 5-hydroxytryptamine and $BaCl_2$ as the ability of these drugs to cause muscular contraction in the fundus was irreversibly inhibited when the stomach preparation was heated at 47° C. for 20 min. The fact that both these amines act upon heat-labile receptors appears to support the hypothesis of a common receptor. The cholinergic drug furtrethonium acts upon receptors that are heat-stable, i.e. receptors whose proteins are not functionally important. It was concluded that methods are still needed for studying specific receptor sites without affecting extra-receptor sites on the cell membrane.

5468 MEASUREMENT OF CHARACTERISTIC PARAMETERS IN THE ELECTROMYOGRAM OF THE NORMAL HUMAN STOMACH. CHANGES DEPENDING UPON LOCATION OF THE ELECTRODE. (Fr.) Couturier, D. (Bichat Hosp., Paris), C. Rozé, J. A. Paolaggi and C. Debray. *Arch. Fr. Mal. App. Dig.* 60(3, Suppl. 1): 11-22, 1971.

During laparoscopies performed on 21 patients, electrical activities were recorded from various points on the serosal side of the stomach from the higher part of the corpus ventriculi to the pylorus. The position of the electrode was determined visually. In the bottom 2/3 of the stomach pace-setter potentials with an average frequency of 3 cycles/min were observed; the frequency of these potentials did not vary much from one patient to another and appeared to be independent of age and sex. The amplitude and velocity of propagation of these pace-setter potentials increased from the corpus to the antrum. In the antrum point potentials were superimposed on an average of 9% of the pace-setter potentials, but this varied from 0-45%. Point potentials appeared 2-4 seconds after pace-setter potentials. In parts of the stomach below the curvatures point potentials were rarely observed.

5469 VAGAL NON-ADRENERGIC INHIBITION OF GUINEA-PIG STOMACH. (E.) Beani, L. (U. Pisa Dept. Pharmacol., Italy), C. Bianchi and A. Crema. *J. Physiol. (Lond.)* 217(2):259-279, 1971.

The mechanical and electrical effects of vagal and sympathetic stimulation on the guinea pig stomach was studied in vitro using an isolated muscle strip from the gastric body. The excitatory response to vagal stimulation became inhibitory following treatment with atropine (1×10^{-6} -1×10^{-7} g/ml). While sympathetic inhibition was nearly completely blocked by guanethedine or reserpine, vagal stimulation was undisturbed. Hexamethonium (2×10^{-5} -5×10^{-5} g/ml) added to atropine plus guanethedine pretreated strips, consistently reduced vagal inhibition, the effect being inversely related to the stimulation rate. 5-Hydroxytryptamine (5-HT 5×10^{-6} - 1×10^{-5} g/ml) gave rise to deep relaxation with partial recovery of tone after 10-15 min, and when given after hexamethonium, 5-HT tachyphylaxis left the hexamethonium-resistant vagal inhibition unchanged. While high stimulation rates were required for observable effects, sympathetic stimulation was always inhibitory in the many muscle cells which were innervated by vagal and sympathetic nerves. Stimulation of vagal fibers in the presence or absence of atropine at a low rate was followed by either excitatory junctional potentials often followed by spikes, or by inhibitory junctional potentials. When the effect of guanethedine (5×10^{-6} g/ml) was tested in spontaneously firing cells, it selectively blocked sympathetic inhibition (20/sec) with no effect on vagal stimulation (2/sec).

5470 EFFECTS OF GRADED ACETYLCHOLINE INFUSIONS ON INTESTINAL MOTILITY, VOLUME, AND BLOOD FLOW. (E.) Kewenter, J. (U. Goteborg 3rd Dept. Surg., Sweden). *Scand. J. Gastroenterol.* 6(5):435-440, 1971.

The effects of graded acetylcholine (ACH) doses infused intra-arterially (i.a.) to the intestine on intestinal motility, volume, and blood flow were studied in 27 cats. Infusion of lower doses of ACH (0.1 - 1 γ/min) was followed by increases in the blood flow in denervated preparations up to about half of the maximal flow. Further increases in the ACH doses caused decreased blood flow in proportion to the doses given. The intraluminal pressure increased directly with the ACH dose. At an ACH infusion rate of 10 γ/min or more, there was a clear relationship between jejunal motility and blood flow. A net increase of intestinal volume was observed during the i.a. ACH infusion at doses higher than 10 γ/min. The volume fluctuated with the changes in intraluminal pressure and blood flow, decreasing at the motility peaks and increasing at the transient intraluminal pressure reductions. However, with each motility cycle there was a net increase of intestinal volume, which thus increased in a stepwise manner. Half of this volume increase was due to an increase in intestinal mass, indicating wall edema.

5471 THE EFFECT OF SOME SPASMOLYTIC DRUGS ON THE CHOLEDOCHO-DUODENAL JUNCTION IN MAN. (E.) Kewenter, J. (Sahlgrenska Hosp., Goteborg, Sweden) and N. G. Kock. *Scand. J. Gastroenterol.* 6(5):401-405, 1971.

The effect of morphine alone and with atropine, methylscopolamine, butylscopolamine, papaverine or glyceryl nitrate on common bile duct pressure was measured in patients who had undergone cholecystectomy 5 days previous to the studies. Following the i.v. administration of morphine (2.5 mg), the intracholedochal pressure increased significantly in all 10 patients. The mean increase in choledochal pressure following morphine and atropine (0.5 mg) administration was less than the corresponding increase after morphine alone, but the difference was not significant. Administration of morphine and methylscopolamine (10 mg) resulted in a pressure curve which initially reached only approximately half that of the level found after morphine alone. Butylscopolamine (80 mg) injection after morphine resulted in a markedly lower pressure curve compared with the curve following morphine alone. Sublingual administration of glyceryl nitrate (0.5 mg) 2 min after morphine injection resulted in a marked but short-lasting depression of the pressure.

5472 ESOPHAGOTONOKYMOGRAPHIC AND ROENTGENOCINEMATOGRAPHIC STUDY OF THE MECHANISM OF CLOSURE OF THE CARDIA. (Rus.) Grebenev, A. L., M. M. Salman and A. S. Stepenko. *Klin. Med. (Mosk.)* 49(2):86-92, 1971.

5473 TONE OF THE GASTROESOPHAGEAL JUNCTION: ITS RESPONSE TO ABDOMINAL COMPRESSION AND TO SWALLOWING. (E.) Henderson, R. D. (U. Toronto Dept. Surg., Ontario, Canada) and K. Rodney. *Can. J. Surg.* 14(5):328-334, 1971.

5474 THE MIDBRAIN AND GASTROINTESTINAL MOTOR ACTIVITY. FUNCTIONAL TOPOGRAPHY OF MESENCEPHALIC STRUCTURES WHICH CONTROL GASTROINTESTINAL MOTOR ACTIVITY. (Ger.) Bernthal, I. (Inst. Med. Pharm., Bucharest, Rumania), A. Faibis and E. Wawernia. *Rev. Roum. Physiol.* 8(3):227-234, 1971.

5475 MASS MOVEMENTS AND INTRACOLONIC PRESSURES. (E.) Torsoli, A. (U. Rome 2nd Med. Clin.), M. L. Ramorino, M. V. Ammaturo, L. Capurso, P. Paoluzi and F. Anzini. *Am. J. Dig. Dis.* 16(8):693-696, 1971.

5476 PROPULSION AND RETROPULSION OF NORMAL COLONIC CONTENTS. (E.) Ritchie, J. A. (Radcliffe Infirm., Oxford, England), S. C. Truelove, G. M. Ardran and M. S. Tuckey. *Am. J. Dig. Dis.* 16(8):697-704, 1971.

5477 METHODS FOR RECORDING ELECTRICAL ACTIVITY OF THE HUMAN COLON IN VIVO. CLINICAL APPLICATIONS. (E.) Provenzale, L. (U. Catania Inst. Spec. Surg. Pathol., Italy) and M. Pisano. *Am. J. Dig. Dis.* 16(8):712-723, 1971.

5478 EFFECTS OF CATECHOLAMINES, NICOTINE, ACETYLCHOLINE AND POTASSIUM ON THE MECHANICAL ACTIVITY OF THE COLONIC MUSCULARIS MUCOSAE IN THE CAT. (E.) Onori, L. (U. Rome 2nd Med. Clin.), C. A. Friedmann, G. M. Frigo and M. Tonini. *Am. J. Dig. Dis.* 16(8):689-692, 1971.

5479 NERVOUS REGULATION OF GASTRIC MOTILITY. (Nor.) Haffner, J. (Pharmacol. Inst., Oslo, Norway), S. Aune, G. Jansson and J. O. Stadaas. *Tidsskr. Nor. Laegeforen.* 91(8):596-602, 1971.

5480 SPASMOLYTIC EFFECTS OF CADMIUM AND ZINC IONS UPON THE GUINEA PIG ISOLATED

ILEUM PREPARATION. (E.) Schnieden, H. (Univ. Dept. Pharmacol., Manchester, England) and R. C. Small. *Br. J. Pharmacol.* 41(3):488-499, 1971.

5481 MECHANISM OF SMOOTH MUSCLE CONTRACTION. AN ELECTRON MICROSCOPE STUDY OF THE MOUSE LARGE INTESTINE. (Ger.) Heumann, H. G. (Univ. Histol. Ctr., Heidelberg, Germany). *Cytobiologie* 3(2):259-281, 1971.

5482 METHOD FOR STUDYING ELECTRICAL AND MECHANICAL ACTIVITY OF ISOLATED INTESTINE. (E.) Perkins, W. E. (Univ. Illinois Dept. Physiol. Biophys., Urbana, Ill.). *J. Appl. Physiol.* 30(5):768-771, 1971.

5483 ANAL CONTINENCE. PHYSIOLOGICAL DATA AND APPLICATION TO FUNCTIONAL EXPLORATION. (Fr.) Gouin, B. (Bichat Hosp., Paris), D. Couturier, C. Roze and C. Debray. *Presse Med.* 79(10):447-454, 1971.

See also numbers: 5414, 5415, 5486, 5628, 5767, 5957

5484 REGENERATION OF RAT SUBMANDIBULAR GLAND FOLLOWING PARTIAL EXTIRPATION. A LIGHT AND ELECTRON MICROSCOPIC STUDY. (E.) Hanks, C. T. (State U. New York Dept. Oval Pathol., Buffalo) and A. P. Chaudhry. *Am. J. Anat.* 130(2):195-208, 1971.

5485 EFFECT OF XYLAMIDE ON SOME ACTIONS OF CERULEIN. (It.) Mantovani, P. (Univ. Parma Inst. Pharmacol., Italy), G. L. Piccinin and M. C. Ugolotti Adorni. *Arch. Int. Pharmacodyn. Ther.* 189(2):319-327, 1971.

See also numbers: 5417, 5489, 6036, 6063

STOMACH

5486 SIMULTANEOUS OBSERVATION OF GASTRIC MOTOR AND SECRETORY RESPONSE TO VAGAL STIMULATION IN NORMAL AND DIABETIC DOGS. (E.) Sugawara, K., R. C. Chawla and M. M. Eisenberg (Mt. Sinai Hosp., Minneapolis, Minn.). *Surgery* 70(3):325-333, 1971.

Gastric acid secretory and motor activity were measured after the administration of insulin and 2-deoxy-D-glucose (2-DG) to normal and diabetic dogs to evaluate their response to changes in blood sugar. In normal dogs, insulin (1.0 U/kg) and 2-DG (100-150 mg/kg) stimulated both gastric acid secretion and motility, and caused a gradual decrease in the serum potassium level. In diabetic dogs, insulin (2.0-5.0 U/kg) did not stimulate either secretion or motility until after a latent period of 60-195 min; however, 2-DG (250-400 mg/kg) administration was followed by the onset of acid secretion and motility stimulation within 15 min. With 2-DG, the blood sugar level was increased significantly while the serum potassium level decreased. Critically low blood levels seem to be necessary for insulin to stimulate gastric acid secretion and motility in both normal and diabetic dogs.

5487 EFFECTS OF EXOGENOUS ATP ON ACID SECRETION IN FROG GASTRIC MUCOSA. (E.) Kidder, G. W., III (Wesleyan U. Biol. Dept., Middletown, Conn.). *Am. J. Physiol.* 221(2): 421-426, 1971.

The addition of ATP, ADP or adenosine in the serosal bathing solution in chambered frog gastric mucosa were studied for their effects on secretory rate, potential difference and cytochrome steady state. The addition of ATP produced a prompt increase in secretory rate, followed by a decrease before returning to a steady state somewhat higher than the control state. Also, the potential rose rapidly (after a quick dip) and then rose more slowly to a new steady state value higher than the control value. The cytochrome signal assumed a new steady state more oxidized than the control steady state, as would be expected from the secretory inhibition. ADP and adenosine did not stimulate secretion. Both ATP and ADP, but not adenosine, increased the time required following reoxygenation for secretion to resume. The correlation between secretion and cytochrome c steady state shifts is consistent with the results from inhibition and histamine stimulation. ATP, ADP and adenosine have different effects on the gastric mucosa and are therefore not acting by a common intermediate. Possible mechanisms of action include direct penetration of the added nucleotides on the serosal membrane, and transformations of the nucleotides into different forms before penetration and action.

5488 EVIDENCE AGAINST HISTAMINE AS FINAL CHEMOSTIMULATOR OF GASTRIC ACID SECRETION. (E.) Hakanson, R. (U. Lund Dept. Pharmacol. Surg., Sweden) and G. Liedberg. *Am. J. Physiol.* 221(2):641-643, 1971.

To investigate whether gastrin and vagal excitation are dependent on histamine as an intermediate in evoking gastric acid secretion, antrectomized male Wistar rats were used for determination of gastric mucosal histamine and histidine decarboxylase activity. Insulin failed to affect a reduction in histamine content and did not activate gastric histidine decarboxylase after antrectomy, even though its stimulating effect on acid secretion persisted. Since insulin stimulates acid secretion through vagal excitation independently of histamine release and formation, apparently histamine is not a mediator of the insulin-induced acid secretion. Hexamethonium which caused a slight decrease in basal acid secretion, completely blocked histamine-induced acid secretion but not that induced by pentagastrin. Therefore, pentagastrin retained its acid-stimulating capacity under conditions when the acid-stimulating effect of histamine was blocked.

The function of gastric histamine is probably associated with some specific cytochemical or cytophysiological process in those endocrine cells (oxyntic gland area) in which it is produced and stored.

5489 SULFATED GLYCOPROTEINS IN HUMAN GASTRIC SECRETION AFTER ESOPHAGECTOMY. (Fr.)

Lambert, R. (E. Herriot Hosp., Lyon, France), F. Martin and C. André. *C. R. Soc. Biol. (Paris)* 164(11):2279-2282, 1970.

By electrophoresis on cellulose acetate, sulfated glycoproteins were found in saliva, but not in gastric juice, from 2 men, aged 48 and 50 yr who had undergone esophagectomy for cancer 1-2 months before. In the first patient small traces of compounds were found with mobilities close to those of chondroitin sulfate or nucleic acids, but these probably come from nuclear debris and interstitial tissue. These results suggest that sulfated glycoproteins, which are normally present in human gastric juice, may originate in salivary, rhinopharyngeal, or bronchial secretions or in secretion from the esophageal mucous glands.

5490 THE EFFECT OF ARGININE MODIFICATION ON THE pH DEPENDENCE OF PEPSIN ACTIVITY.

(E.) Kitson, T. M. (U. Oxford Dyson Perrins Lab., England) and J. R. Knowles. *FEBS Lett.* 16(4): 337-338, 1971.

The effect of phenylglyoxal, and arginine specific reagent, on the activity of pepsin was studied. When pepsin (5 mg/ml) was allowed to react at room temperature with 100 mM phenylglyoxal hydrate at pH 5.5 for 4 hr, the proteolytic activity (determined by hemoglobin assay and by the continuous automatic ninhydrin technique) was decreased by 55% where it remained for 20 hr. Lineweaver-Burk plots indicated that inactivation took place not by blocking of the enzyme's active site, but by an effect on the catalytic process subsequent to enzyme-substrate binding. The pK_a of 4.7 exhibited by native pepsin was unchanged after modification by phenylglyoxal, whereas the pK_a of 1.0 was raised to approximately 1.5. There was no difference in the arginine content of the modified and unmodified enzyme.

5491 KINETIC COMPARISON OF HUMAN, CANINE AND PORCINE PEPSINS.

(E.) Tritsch, G. L. (Roswell Park Mem. Inst., Buffalo, N. Y.) and C. R. Sachatello. *Comp. Biochem. Physiol.* 39(4B):715-718, 1971.

The variation of the Michaelis constant (K_m) and the extrapolated maximum rate of reaction at infinite substrate concentration (V) with pH for hemoglobin of crystalline porcine pepsin and human and canine gastric juices was studied. The K_m's for human, canine and porcine pepsin for hemoglobin were 6.3×10^{-4} M, 10.0×10^{-4} M, and 1.1×10^{-4} M, resp. at pH 2. The ionizing group on the enzyme-substrate complexes of human and canine pepsin-hemoglobin showed the same dissociation constant (pK=3.0) while that for porcine pepsin-hemoglobin was at a lower pH. At pH 2, valid comparisons can seemingly be made between human and canine pepsins on a molar basis, porcine pepsin being a reasonable gravimetric standard for such studies.

5492 ORIGIN OF THE SULFATED GLYCOPROTEINS IN HUMAN GASTRIC SECRETIONS. (E.)

Lambert, R. (E. Herriot Hosp., Lyon, France), C. André and A. Bérard. *Digestion* 4(4):234-249, 1971.

In studying the origin of sulfated glycoproteins in human gastric secretions, some observations in various patients were made: in vivo tracer studies with radiosulfate, collection of uncontaminated gastric juice and exploration of other sources of contamination of the gastric juice. Saliva obtained from a patient after i.v. injection of radiosulfate contained 10.2 mg of sulfated glycoproteins. There was no histochemical or histoautoradiographical evidence of sulfate in fundic biopsies 6 and 24 hr after the injection of the isotope. Although sulfated glycoproteins were present in the salivary secretions of 2 esophagectomized patients, there was no evidence of these substances in the gastric juice obtained at gastrostomy. Examination of the esophagogastric junction in 2 specimens revealed a large amount of acidic glycoproteins located in the cardiac glands. These glands may be responsible for the presence of sulfated glycoproteins in the gastric juice, especially when the salivary contamination is prevented.

5493 RESERPINE-INDUCED DEPLETION OF GASTRIC VITAMIN B12-BINDING PROTEINS IN THE RAT.

(E.) Håkanson, R. (U. Lund Dept. Pharmacol., Sweden), G. Liedberg and K. Lindstrand. *Experientia* 27(7):807-808, 1971.

The effect of reserpine on gastric stores of vitamin B_{12}-binding proteins was studied in rats, mice, hamsters, guinea-pigs and rabbits, and the effect of vagal denervation on gastric histamine content and vitamin B_{12}-binding proteins were investigated in the rat. Reserpine mobilized gastric vitamin B_{12}-binding proteins and histamine in the rat, however, it had no effect in the mouse, hamster, guinea-pig and rabbit. While reserpine failed to deplete the gastric stores of vitamin B_{12}-binding proteins in these animals, the B_{12}-binders of the rat reside in a reserpine-sensitive storage pool of gastric cells. Vagal denervation caused total inhibition of reserpine-induced mobilization of gastric histamine and vitamin B_{12}-binding proteins. The antipernicious principle (intrinsic factor) seems, therefore, to be located in some gastric endocrine cell type.

5494 FEAR AND GASTRIC ACID PRODUCTION. (Ger.) Berner, P. (Univ. Psychiatr. Neurol. Clin., Vienna), A. Neumayr and G. Stacher. *Z. Gastroenterol.* 9(4):256-265, 1971.

Fear induced in 4 normal subjects by suggestion under hypnosis (lasting 60-80 min.) caused a statistically significant increase in stomach acid production (measured using the endoradial probe) as compared to basal values. A slight initial decrease (minimum after 46 min) in acidity was noted at the beginning of the experiment (probably due to a predominance of sympathetic impulses). Peak acid production occurred almost always after discontinuation of hypnosis (and fear suggestion) with a maximum after 84 min (due to a vagal counter-regulation). Acid secretion induced by fear sometimes reached levels as high as those obtained in the same subjects by the maximal betazole (1.7 mg/kg) or insulin (0.3 units/kg) tests. Administration of diazepam (10 mg. i.v.) at the start of the experiment first caused a strong decrease and later only a moderate increase in acid production after discontinuation of hypnosis (maximum 7 min). Statistical analysis revealed that the maximal levels induced by fear were significantly lower after diazepam administration than those reached when no diazepam or a placebo were given to the subjects. Neither hypnosis alone nor diazepam or placebo alone (without fear) caused a change in acid production when compared to basal levels.

5495 DETERMINATION OF ELECTROLYTE CONCENTRATIONS IN PRIMARY GASTRIC SECRETION IN NORMAL SUBJECTS AFTER ADMINISTRATION OF LARGE DOSES OF HISTAMINE. (Fr.) Ligny, G. (Charleroi Civil Hosp., Belgium) and J. Manouiloff. *Arch. Fr. Mal. App. Dig.* 60(3, Suppl. 1):33-46, 1971.

After injection of a large dose of histamine hydrochloride (0.04 mg/kg s.c.), close correlations were obtained between total acidity, free acidity, and Na^+, Cl^-, and Ca^{++} concentrations in 16 normal subjects. Ionic concentrations of gastric parietal and nonparietal secretion were calculated by extrapolating relations between electrolyte concentration and concentrations of total and free acid. After administration of histamine to 20 normal subjects, the concentration of K^+ did not change linearly, but initially increased, reached a maximum, and then decreased. The Na^+ concentration in alkaline, nonparietal secretion was calculated in 23 normal subjects from individual relations between total acidity and the Na^+ concentration. After histamine injection Na^+ concentrations in nonparietal gastric secretion increased to values which were almost isotonic with plasma.

5496 INHIBITION OF GASTRIC SECRETION IN MAN BY PROSTAGLANDIN A_1. (E.) Wilson, D. E. (U. Illinois Hosp., Chicago), C. Phillips and R. A. Levine. *Gastroenterology* 61(2):201-206, 1971.

Data are presented which show that prostaglandin A_1 (PGA_1) reduces human gastric secretory responses to histamine and may show a beneficial role in treatment of peptic ulcer and gastric mucosal bleeding. The effect of PGA_1 on gastric secretion was evaluated on 18 normal individuals. PGA_1 was infused for 30 min in low dose (0.5 to 0.6 µg/kg/min) and in higher dose (1.0 to 1.25 µg/kg/min) to separate groups of 9 subjects after a steady state of gastric output was obtained using i.v. histamine (0.015 mg/kg/hr). PGA_1 inhibited mean volume by 30% and acid output by 25% during infusion. The mechanism of this action is unknown. Subjects receiving the lower dose had a greater reduction in gastric secretion indicating the effects to be dose-dependent. After infusion was discontinued mean volume and acid output were 98% and 103% of control levels, resp. Plasma free fatty acid levels and pulse rate were increased during PGA_1 infusion. However, these are the first human studies indicating that PGA_1 does not affect plasma immunoreactive insulin, growth hormone levels, or plasma cortisol.

5497 EFFECT OF UNILATERAL VAGOTOMY ON GASTRIC SECRETION IN THE FERRET. (E.) Basso, N., N. Umeda, J. L. A. Roth, E. Passaro, Jr. and C. J. Pfeiffer (Presbyterian-U. Pennsylvania Med. Ctr., Philadelphia). *Gastroenterology* 61(2):207-210, 1971.

The effect of posterior unilateral, truncal (subdiaphragmatic) vagotomy on the gastric acid response to pentagastrin, histamine, and insulin was evaluated in the chronic gastric fistula ferret. Considerable difference was observed in the response to these stimulants indicating that nonvagal influences vary. Unilateral vagotomy reduced the basal acid output and the acid output to each of these agents. Reduction in acid concentration did not parallel the decrease in acid output. The maximal dose of pentagastrin stimulated acid output more than the maximum dose of histamine in intact animals, but after unilateral vagotomy acid output was similar for pentagastrin, histamine and insulin stimulation supporting the hypothesis that the vagus must be intact to achieve maximum pentagastrin response.

5498 STUDY OF BICARBONATE SECRETION BY THE HUMAN STOMACH. (Fr.) André, C. (E. Herriot Hosp., Lyon, France), M. Vagne, R. Lambert and J. Bruhière. *C. R. Soc. Biol. (Paris)* 164(11):2275-2278, 1970.

Measurements of gastric HCO_3^-, Cl^-, Na^+, and K^+ secretion were made on 20 normal subjects under basal conditions and after administration of a glycine-NaOH buffer (pH 9.4) and s.c. administration of betazole (1.5 mg/kg). Betazole increased basal secretion of HCO_3^- by 235-266%, of Cl^- by 373-590%, and of K^+ by 138-185%. Most of these increases were significant. Gastric secretion of HCO_3^- was not constant but paralleled acid secretion. It is suggested that HCO_3^- is secreted by the parietal cells.

5499 COMPARISON OF EXOGENOUS SECRETIN AND DUODENAL ACIDIFICATION ON PEPSIN SECRETION IN DOGS. (E.) Johnson, L. R. (U. Oklahoma Sch. Med., Oklahoma City) and L. A. Harrison. *Am. J. Physiol.* 221(3):784-787, 1971.

Evidence is presented which supports the hypothesis that secretin is the only enterogastrone responsible for the pepsin response during duodenal acidification in the dog. Secretin stimulated pepsin secretion and duodenal acidification stimulates pepsin secretion in the dog. In 3 dogs with Heidenhain pouches and gastric-intestinal fistulas, pepsin outputs were determined during i.v. administration of secretin and intestinal acidification. The dose-response curves for acidification and exogenous secretin were similar. Under conditions of low pH secretin release was a function of the rate of entry (mN/time) of titratable acid into the intestine. Secretin doses of 0.5, 1.0, and 2.0 U/kg-hr were administered and HCl acid was infused into a duodenal cannula in concentrations of 40, 80, 120, and 160 mN at a rate of 150 ml/hr. Pepsin secretion increased with each 6 mEq H^+/hr increment. Approximate maximal concentrations for acid and pepsin were not exceeded. The highest dose of secretin and the highest concentration of acid produced pepsin secretion 6-fold over basal rate while lower doses produced correspondingly lower pepsin secretion. It was concluded that secretin accounts for the changes in gastric and pancreatic secretions when physiological amounts of acid enter the dog intestine.

5500 A GASTRIC SECRETION TEST IN THE INTACT GUINEA-PIG. (E.) Capoferro, R. (Natl. Hosp., Oslo, Norway) and O. Torgersen. *Scand. J. Gastroenterol.* 6(5):429-433, 1971.

A new method for the study of gastric secretion using p.o. intubation in the guinea pig is presented. In salivary secretion tests, the total secretion varied considerably (0.1 - 3.4 ml/hr), but the effectiveness of the collection adapter device in preventing swallowing of saliva was constant: less than 10% of the total salivary secretion was recovered from the esophagus. Contrast medium studies indicated completeness of gastric juice collection. The mean pH values of samples varied between 1.9 for basal secretion and 1.0 for the maximal betazole - or pentagastrin stimulated secretion. The lowest dose that elicited an acid output significantly higher than the basal secretion was 1 µg/kg/hr for pentagastrin and 1 mg/kg/hr for betazole. The appropriate dose of betazole for the secretion test was determined to be 45 mg/kg/hr since results with this dose showed good reproducibility.

5501 GASTRIC SECRETION OF ACID AND INTRINSIC FACTOR IN DERMATITIS HERPETIFORMIS. (E.) Andersson, H. (Sahlgren's Hosp., Goteborg, Sweden), G. Dotevall and H. Mobacken. *Scand. J. Gastroenterol.* 6(5):411-416, 1971.

Gastric secretion and gastric intrinsic factor (IF) production, absorption of D-xylose and lactose, and the excretion of fat were studied in 10 patients with dermatitis herpetiformis. Both basally and after pentagastrin stimulation gastric acid secretion showed low values in 9 out of the 10 patients, 3 showing achlorhydria and 6 having hypochlorhydria. IF secretion after pentagastrin stimulation was low in 3 patients, subnormal in 6, and normal in 1 of the 9 patients studied. Serum antibodies against gastric parietal cells could be demonstrated in 2 patients and against thyroid cytoplasmic antigen in 1 patient. In 2 of the 4 patients on whom a gastric mucosal biopsy was performed, the mucosa of the fundus of the stomach was atrophic, and a chronic inflammatory reaction was observed. The D-xylose test was abnormal in 6 patients and the fecal fat excretion was elevated in 6. Maltase, isomaltase and saccharase activities were low. The small intestinal mucosa was flat in 4 patients, convoluted in 3, and villous in 3. No correlation was observed between the gastric abnormality and the patients' age, the intensity of the skin disease, medication, or small intestine mucosal appearance.

5502 ACID RESPONSES OF DENERVATED FUNDIC (HEIDENHAIN) POUCHES TO MEALS COMPARED WITH THOSE TO HISTAMINE AND PENTAGASTRIN. (E.) Wasunna, A. E. O. (Univ. Dept. Surg., Manchester, England), B. F. Buxton, B. S. Bedi and I. E. Gillespie. *Scand. J. Gastroenterol.* 6(5):407-410, 1971.

Gastric acid responses to single large meals were compared with those to various doses of histamine and pentagastrin in 3 dogs with denervated Heidenhain pouches. Acid outputs from the pouches increased with larger doses of histamine, pentagastrin, or the size of the meal reaching a maximum at levels of 0.4 mg/kg/hr, 4.0 mg/kg/hr, and 60 g/kg, resp. The responses to the larger meal (60 g/kg), and the maximal response to pentagastrin were 93% and 43% resp., above basal levels. Thus, maximal response to histamine and to the meal were about the same, while pentagastrin gave a lower response. Combinations of humoral and/or neural stimuli, endogenously initiated by food, may produce a potentiated gastric acid response which exceeds that produced by pentagastrin alone.

5503 NEW METHOD FOR EVALUATING TOPICAL ACTION OF SUBSTANCES ON GASTRIC MUCOSA. (E.) Alphin, R. S. (A. H. Robins Res. Labs., Richmond, Va.) and D. A. Droppleman. *J. Pharm. Sci.* 60(9):1314-1316, 1971.

A new method is presented which allows the simultaneous evaluation of the application of 1 or more substances on adjacent gastric mucosa sites and observation of gastrotoxic events as they occur. Exposure time and quantity of substances applied can be varied easily. The apparatus consists of a Plexiglas chamber which holds 3 glass containers into which test agents are placed. The results of the application of equimolar amounts of aspirin (18.0 mg) and phenylbutazone (30.8 mg) on 34 gastric mucosa sites in 6 cats are presented. Of 17 sites exposed to aspirin for 1 hr, 16 showed bleeding or lesions while only slight bleeding and no lesions were observed in the phenylbutazone-treated areas. An additional application of this method was shown by determining the effect of the pH of the artificial gastric juice on the bleeding produced by aspirin. It was found that when the pH of the juice was maintained above 2.0 little or no bleeding resulted from topical administration of 10 mg aspirin. However, as the pH decreased from 2.0 there was a marked increase in gastric bleeding. This apparatus can be adapted for use in large or small animals.

5504 EFFECT OF CALCIUM CARBONATE TREATMENT ON BLOOD pH AND GASTRIC ACIDITY. (E.) Groza, P. (D. Danielopolu Inst. Normal Physiol., Bucharest), M. Corneanu and S. Ionescu. *Rev. Roum. Physiol.* 8(3):209-215, 1971.

Treatment with calcium carbonate (30-60 g/day p.o. for 7 days) in a group of 20 patients with gastric and duodenal ulcers resulted in a decrease of the average values of gastric secretion, but with wide individual variations. In general, treatment resulted in a slight alkalinization of the blood as seen from the elevated level of metabolic blood components of pH. Administration of histamine caused a similar alkalinization, both prior to and following calcium carbonate treatment, expressed by a rise in pH due to elevated bicarbonate and excess base levels. It was concluded that the relationship between acid-base components of the blood and histamine-induced secretion are insufficiently accurate to serve as an index of gastric secretion.

5505 THE EFFECT OF 2-(2,6-DICHLOROPHENYLAMINO)-2-IMIDAZOLINE HYDROCHLORIDE (CATAPRESAN) ON GASTRIC AND PANCREATIC SECRETION. (Ger.) Kaess, H. (U. Heidelberg Med. Klin., Germany) and J. von Mikulicz-Radecki. *Eur. J. Clin. Pharmacol.* 3(2):97-101, 1971.

The effect of i.v. admin. of catapresan (2 µg/kg and 4 µg/kg) on gastric secretion as well as on exo- and endocrine pancreas secretion was studied in 35 patients with dyspeptic symptoms. The 2 µg/kg dose had no effect on fasting gastric secretion but 4 µg/kg caused a strong decrease in volume and acid secretion without affecting acid concentration. The compound (4 µg/kg) administered prior to stimulation of gastric secretion with betazol (2 µg/kg) inhibited volume and acid secretion but had no effect when administered simultaneously with betazol. Gastric secretion after maximum pentagastrin (12/µg/kg/2 hr) and insulin (0.2 U/kg) stimulation was also strongly inhibited by 4 µg/kg of catapresan. Secretin (1 U/kg)-induced pancreas (bicarbonate) secretion was also markedly reduced after catapresan. The compound had no effect on basal insulin and blood sugar levels in normal subjects and one patient with hyperinsulinism.

5506 UREMIA AND PROLIFERATION OF THE GASTRIC MUCOSA. AUTORADIOGRAPHIC INVESTIGATIONS ON PHASES OF THE CELL CYCLE AND GENERATION TIME OF THE GASTRIC MUCOSA IN UREMIC RATS. (Ger.) Wegener, K. (U. Heidelberg Pathol. Inst., Germany), M. Börner, B. Krempien, M. Wanke and E. Ritz. *Virchows Arch. Zellpathol.* 8(3):186-195, 1971.

The ^{3}H index, mitotic index, duration of the S phase, duration of mitosis, generation time, G-1 and G-2 phase of 4 proliferation zones (isthmic and parietal cells of the fundus, surface and glandular cells of the pylorus) were determined by the double labeling technique in uremic Wistar rats 5 days after bilateral 5/6 nephrectomy and compared to controls (renal decapsulation). During uremia the H^3 index increased in all 4 types of cells but the differences between the H^3 indices in uremic and control animals decreased progressively from the isthmic to the pyloric glandular cells. In uremic animals a statistically significant increase in mitotic index and shorter DNA synthesis time (S phase) was seen only in the isthmic and parietal cells of the fundus. There was no change in the S phase of pyloric cells when compared to controls. There was a significant shortening of generation time and G-1 phase which was more pronounced in the fundus than pylorus. There was no change in the mitotic time in the cells of the 4 proliferation zones. It was noteworthy that from the fundus to the pylorus the degree of proliferation and duration of the cell cycle phases became more like those of the intestinal tract. It is concluded that gastric hydrochloric acid which in uremia is neutralized by ammonia is not essential for mucosal proliferation.

5507 TITRATION OF MAGNESIUM TRISILICATE MIXTURE AGAINST GASTRIC ACID SECRETION. (E.) Williams, M. (Queen Elizabeth Med. Ctr., Birmingham, England) and J. S. Crawford. *Br. J. Anesth.* 43(8):783-784, 1971.

Magnesium Trisilicate Mixture BPC was titrated against a hydrochloric acid solution which represented a high average gastric acid secretion to determine the dose required to avoid the danger of the acid-aspiration syndrome. The 2-hourly administration of 10 ml of the antacid was found to be an inefficient method of maintaining intragastric pH above the critical level of 3.0 in patients with a high average level of gastric acid secretion. However, 15 ml of the antacid given every other hour appeared to be an adequate precautionary measure. Except in circumstances of an unusually high and prolonged acid secretion, the routine administration of 15 ml of Magnesium Trisilicate Mixture BCP every 2 hr will maintain a safe intragastric pH.

5508 CAFFEINE-STIMULATED ACID AND PEPSIN SECRETION: DOSE-RESPONSE STUDIES. (E.) Debas, H. T. (Vancouver Gen. Hosp., British Columbia, Canada), M. M. Cohen, I. B. Holubitsky and R. C. Harrison. *Scand. J. Gastroenterol.* 6(5):453-457, 1971.

The acid and pepsin response to graded doses of i.v. caffeine, the corresponding plasma caffeine levels and the relationship of these levels to those achieved by normal coffee consumption were evaluated in 4 healthy human subjects. The threshold of both acid and pepsin secretion in response to i.v. caffeine was at an infusion of 160 mg/hr. At that rate of infusion the plasma caffeine level was about 5 mg/liter. With increasing doses a linear relationship was established between both acid and pepsin output and the plasma caffeine level. The maximum secretory response achieved was at a plasma concentration of about 20 mg of caffeine/liter and was approximately 44% of the pentagastrin-stimulated maximal output. Similar plasma caffeine levels were observed after the subjects drank 4-5 cups of coffee over a period of 4-5 hr.

5509 LACTIC ACID IN GASTRIC JUICE. (E.) Piper, D. W. (Roy. North Shore Hosp., Sydney, Australia), A. D. Clarke, D. Whitecross and M. Croydon. *Scand. J. Gastroenterol.* 6(5): 465-469, 1971.

The effects of histamine, pentagastrin, insulin, and various sugars on gastric juice lactic acid secretion was studied in normal subjects and patients suffering from gastric and duodenal ulcer or gastric carcinoma. All 3 gastric stimulants caused a fall in lactic acid concentration and a rise in lactic acid output. There was usually a rise in lactic acid concentration and output in response to the administration of glucose, fructose, xylitol or epinephrine. Phenformin was without effect on lactic acid concentration. There was no correlation between the pH of the specimen of gastric juice and its lactic acid concentration nor was there a correlation between lactic acid concentration and titratable acidity after administration of a lactic acid stimulant. Gastric juice lactic acid content seems to reflect the metabolic processes in the gastric mucosal cells.

5510 INHIBITORY EFFECT OF CIGARETTE SMOKING ON GASTRIC SECRETION STIMULATED BY PENTAGASTRIN IN MAN. (E.) Wilkinson, A. R. (Gen. Infirm., Leeds, England) and D. Johnston. *Lancet* 2(7725):628-632, 1971.

Cigarette smoking inhibited gastric acid secretion in pentagastrin stimulated normal volunteers and in patients with gastric or duodenal ulceration. Acid concentration and pepsin output were also decreased after cigarette smoking, the inhibition being greater in normal subjects than in patients with duodenal and gastric ulcer. Smoking led to a significant increase in pulse rate in all 3 groups of subjects and an increased systolic and diastolic blood pressure in normals and duodenal ulcer patients but not in gastric ulcer patients. The reduction in acid output after infusion of 3 mg of nicotine was similar to the reduction produced by cigarette smoking, but failure of the largest (4 mg) dose of nicotine to produce inhibition was unexplained. Inhibition was as great in habitual smokers as in nonsmokers. Smoking after a meal will probably reduce the gastric secretory response to the meal. Giving up smoking by patients with peptic ulcer may lead to an increase, not a therapeutic decrease, in gastric secretion.

5511 ON THE PRESENCE OF HISTIDINE DECARBOXYLASE ACTIVITY IN RAT FORESTOMACH. (E.) Ellenbogen, L. (American Cyanamid Co. Lederle Labs., Pearl River, N. Y.) and R. H. Engel. *J. Pharm. Pharmacol.* 23(8):634-636, 1971.

5512 GASTRIC ACID SECRETION AFTER ORAL AND PARENTERAL ADMINISTRATION OF HISTAMINE TO CIRRHOTICS. (Sp.) Freytes, M. A. (San Roque Hosp., Cordoba, Spain), J. H. Carri and D. Canet. *Rev. Esp. Enferm. Apar. Dig.* 34(6):641-646, 1971.

5513 EFFECT OF AMBIENT TEMPERATURE ON GASTRIC LESIONS AND GASTRIC SECRETION IN SWINE. (E.) Muggenburg, B. A. (U. Wisconsin Coll. Agric., Madison), T. Kowalczyk and W. Olson. *Am. J. Vet. Res.* 32(4):603-608, 1971.

5514 ISOLATION AND CHARACTERIZATION OF BOVINE PEPSIN. (Rus.) Vafin, A. Z. (State Med. Inst., Stavporol, USSR). *Biokhimiia* 36(1):43-48, 1971.

5515 INHIBITION OF GASTRIC SECRETION BY CALCITONIN IN MAN. (E.) Hesch, R. D. (Univ. Med. Clin., Gottingen, Germany), M. Hufner, B. Hasenhager and W. Creutzfeldt. *Hormone Metabol. Res.* 3(2):140, 1971.

5516 DEPENDENCE OF THE DEGREE OF THE EFFECT OF EXOGENOUS HISTAMINE UPON GASTRIC SECRETION ON THE INDICES OF THE METABOLISM OF

ENDOGENOUS HISTAMINE. (Rus.) Gueller, L. I. and Z. P. Kozlova. *Lab. Delo* (4):212-214, 1971.

5517 THE METHOD OF SIMULTANEOUS RECORDING OF THE TEMPERATURE AND THE CONCENTRATION OF HYDROGEN IONS IN THE STOMACH. (Rus.) Korobitsine, V. T. and A. A. Kisselev. *Lab. Delo* (4):210-211, 1971.

5518 COMPARISON OF THE DATA OF THE INDICES OF GASTRIC ACIDITY OBTAINED WITH AND WITHOUT INTUBATION. (Rus.) Khrouchtcheva, E. A., P. G. Karvonidi, E. K. Kozlva and A. G. Kouznetsova. *Lab. Delo* (4):246-247, 1971.

5519 INFLUENCE OF TRASYLOL ON THE ELECTROLYTE SECRETION OF THE SUBMAXIMALLY STIMULATED GASTRIC MUCOSA OF THE HUMAN. (Ger.) Mertz, D. P. *Med. Welt* 22(25):1068, 1971.

5520 GASTRIC SECRETION TESTS. (Sp.) Gutierrez Samperio, C. (La Raza Med. Ctr., Mexico City, Mexico). *Prensa Med. Mex.* 35(11-12):429-437, 1970.

5521 ADVANCES IN GASTRIC PATHOPHYSIOLOGY: SECRETORY INHIBITION. (It.) Cordiano, C. (U. Padua Inst. Spec. Surg. Pathol., Italy) and G. Farello. *Rec. Progr. Med. (Roma)* 50(1): 24-31, 1971.

5522 UTILIZATION OF PARENTERALLY AND INTRAGASTRICALLY ADMINISTERED AMINO ACID SOLUTIONS. (Ger.) Cesnik, H. (Univ. Surg. Clin., Graz, Austria) and R. Szyszkowitz. *Wien. Med. Wochenschr.* 121(13):243-246, 1971.

5523 SERUM GASTRIN AND GASTRIC ACIDITY. (E.) Byrnes, D. J. (St. Vincent's Hosp., Sydney, Australia) and L. Lazarus. *Aust. NZ J. Med.* 1(1):26-29, 1971.

See also numbers: 5436, 5607, 5768, 5831, 5832

PANCREAS

5524 EFFECT OF CHLORPROMAZINE, DESMETHYLIMIPRAMINE AND LITHIUM ON DOPAMINE UPTAKE IN THE RAT PANCREAS. (E.) Nordgren, L. (U. Lund Dept. Histol., Sweden). *Acta Pharmacol. Toxicol. (Kbh.)* 29(5-6):542-544, 1971.

After pretreatment with chlorpromazine (25 mg/kg) or desmethylimipramine (25 mg/kg), the amount of injected dopamine (40 mg/kg) found in rat pancreas was markedly reduced. Pretreatment with lithium produced no effect. After the administration of chlorpromazine and desmethylimipramine, no fluorescence was seen in the exocrine and the endocrine cells, whereas the catecholamine fluorescence of the connective tissue appeared as in the animals given only dopamine. No mast cells were found in these tissue sections. The chemical and histochemical analyses strongly indicate that chlorpromazine and desmethylimipramine, but not lithium can block the uptake of dopamine into the pancreatic cells as well as block the uptake of catecholamines in the adrenergic nerves.

5525 FUNCTIONAL CHARACTERISTICS AND LYSOSOMAL INTEGRITY OF THE ISOLATED PERFUSED CAT PANCREAS. (E.) Ferguson, W. W. (U. Virginia Sch. Med., Charlottesville), T. M. Glenn and A. M. Lefer. *J. Surg. Res.* 11(7):364-374, 1971.

The secretory, respiratory, and vascular responsiveness and ultrastructure of the perfused cat pancreas were studied to determine its physiologic status; and β-glucuronidase activity in pancreatic juice, duodenal secretions, bathing medium, perfusate, and pancreatic homogenates and lysosomal ultrastructure were used to evaluate the lysosomal integrity of the preparation. Within 5 minutes after the onset of perfusion with a physiological salt solution plus dextran, perfusion pressure usually stabilized at 30-35 mm Hg but gradually increased over the next 2½ hr. Pancreozymin and secretin administration decreased the total β-glucuronidase activity, which in the unstimulated perfused pancreas was similar to that in the intact cat pancreas, and caused a marked increase in the volume and trypsin content of pancreatic juice. Hormonal stimulation was followed by an increase in β-glucuronidase activity in pancreatic juice, duodenal secretion, perfusate and the bathing medium, as well as an increase in the number of zymogen granules and lysosomes in the acinar cells. The isolated, perfused cat pancreas preparation seems to maintain a high level of structural and functional integrity both at basal and at maximal secretory levels. Pancreozymin may increase the fragility of pancreatic lysosomes causing the liberation of β-glucuronidase into the pancreatic duct, extracellular space, and intravascular compartment.

5526 STIMULATION OF AMYLASE SECRETION FROM THE PERFUSED CAT PANCREAS BY POTASSIUM AND OTHER ALKALI METAL IONS. (E.) Argent, B. E. (U. Edinburgh Teaching Res. Ctr., Scotland), R. M. Case and T. Scratcherd. *J. Physiol. (Lond.)* 216(3):611-624, 1971.

The effect of potassium and other alkali metal ions on amylase secretion from the pancreas was studied in the perfused cat pancreas. Perfusion with an increased potassium concentration was followed by a large output of amylase, a decrease in the volume rate of secretion, and vasoconstriction. While lithium only depressed the secretory rate, the effects of rubidium and cesium were similar to those of potassium. Amylase secretion was maximal at potassium concentrations of 80 - 90 mM and thereafter declined. Treatment with atropine sulfate blocked the effect of potassium on amylase secretion; however, it had no effect on the secretory rate. Perfusion with excess potassium elicited the release of a vasodepressor material with the properties of acetylcholine which was detected in the perfusate. Replacement of sodium in the perfusate by potassium or sucrose caused similar reductions in the secretory rate. Potassium seems to cause a release of acetylcholine from nerve terminals in the pancreas which stimulates amylase secretion, and the concomitant decrease in secretory rate may be due to sodium deficiency.

5527 INCREASE IN PANCREATIC LIPASE ACTIVITY IN WISTAR H RATS GIVEN A HIGH-LIPID DIET. (Fr.) Lavau, M. (Bichat Hosp., Paris), J. Herzog and J. Trémolières. *Arch. Fr. Mal. App. Dig.* 60(3, Suppl. 1):47-56, 1971.

Activities of exocrine pancreatic enzymes were measured in 2- and 8-month-old male Wistar H rats which had been given control diets or diets containing 41.5% lard after weaning. Diet had no effect on the activities of trypsinogen, chymotrypsinogen, or anti-trypsin factor in either age group, but the high-fat diet doubled lipase activities and decreased amylase activities to less than 1/4 of the control values. As a result of adaptation significant increases in lipase activities occurred within 5 days after rats were placed on the high-fat diet. Lipase activities decreased again to control values in both 2- and 8-month-old rats when the animals were transferred from the high-fat diet to the control diet. In 1-month-old rats administration of the high-fat diet for 4 days caused highly significant increases on serum β-hydroxybutyrate and acetoacetate levels but had no effect on serum free fatty acid levels. This finding suggests that β-hydroxybutyrate and acetoacetate, rather than free fatty acids, might induce biosynthesis of pancreatic lipase in these animals.

5528 ALBUMIN, IgG AND IgA IN HUMAN PANCREATIC JUICE FROM NORMAL ADULTS. (Fr.) Clemente, F. (INSERM Dig. Pathol. Res Unit., Marseille, France), T. Ribeiro, C. Figarella and H. Sarles. *Clin. Chim. Acta* 33(2):317-324, 1971.

The single radial immunodiffusion technique was used to measure concentrations of albumin and immunoglobulin (Ig) G and A in pancreatic juice collected from Wirsung's duct of 5 adults with normal pancreatic function after biliary tract surgery. Albumin constituted 1.26 ± 0.36%, IgG 0.23 ± 0.039%, and IgA 0.18 ± 0.034% of the total proteins in pancreatic juice. Although the levels of IgA and IgG are low in pancreatic juice, unpublished studies indicate that significantly higher concentrations are present in patients with chronic pancreatitis. The ratio of albumin/IgG in pancreatic juice did not differ significantly from that in human serum while the ratios of albumin/IgA and of IgG/IgA were significantly lower. This suggests that secretion of serum proteins occurs by different mechanisms than that of enzymatic proteins.

5529 EFFECT OF PORCINE GASTRIN AND A GASTRIN PENTAPEPTIDE ON PANCREATIC AND BILIARY SECRETION IN ANESTHETIZED RATS. (Fr.) Debray, C. (Bichat Hosp., Paris), C. Vaille, B. Vasseur, J. de la Tour, C. Rozé and M. Souchard. *Sem. Hop. Paris* 47(31-34):2015-2022, 1971.

No changes in biliary or pancreatic secretion occurred in urethane-anesthetized rats when porcine gastrin (200 mg of antral mucosa i.v.) was administered. A synthetic gastrin pentapeptide (100 μg i.v.) had little effect on the output of pancreatic juice but significantly increased the concentration and output of amylase and total proteins during the first hour after injection; the extent of this increase is comparable to that obtained with a moderate dose of pancreozymin (1-2 Harper-Raper cat U). No changes occurred in biliary secretion. Intraduodenal instillation of HCl (100 μEq) immediately increased the output of pancreatic juice by about 75%; this was associated with a significant decrease in protein and amylase concentrations. This phenomenon is attributed to introduction of a tube into the duodenum.

5530 ENDOGENOUS CHOLECYSTOKININ POTENTIATES EXOGENOUS SECRETIN ON PANCREAS OF DOG. (E.) Meyer, J. H. (UCLA Sch. Med., Los Angeles, Calif.), L. J. Spingola and M. I. Grossman. *Am. J. Physiol.* 221(3):742-747, 1971.

The dose-response relation of intraduodenal L-phenylalanine as a stimulant of pancreatic secretion and the effects of intraduodenal L-phenylalanine and i.v. exogenous cholecystokinin (CCK) were studied on 4 dogs with chronic gastric and pancreatic fistulas. Intraduodenal and exogenous CCK induced low bicarbonate and high protein pancreatic secretion and both augmented the maximal bicarbonate response to secretin.

Intravenous secretin increased the protein secretion response to intraduodenal phenylalanine or CCK, but potentiation was not determined. Intraduodenal phenylalanine did not augment bicarbonate secretion indicating that it does not release secretin. Thus, while L-phenylalanine seemingly released CCK from the intestinal mucosa, endogenous or exogenous CCK weakly stimulated bicarbonate, strongly stimulated protein and strongly potentiated bicarbonate secretion stimulated by secretin, with secretin augmenting protein secretion induced by CCK. The release of CCK may account for the effect of duodenal phenylalanine on pancreatic secretion.

5531 EFFECTS OF PARASYMPATHOMIMETIC AGENTS AND VAGAL STIMULATION ON THE FLOW IN THE PANCREATIC DUCT OF THE CAT. (E.) Lenninger, S. (U. Lund Dept. Physiol., Sweden). *Acta Physiol. Scand.* 82(3):345-353, 1971.

Secretin-stimulated cat pancreas showed increased secretion of juice from i.v. injection of methacholine and vagal stimulation. This increased flow was true not only for pancreatic juice but also for salt solution perfused through the gland. The effect of vagal stimulation on the secretion is consistent with other reports. Some of the effects of parasympathomimetic drugs are conflicting. It was observed that methacholine increased the secretion more when the gland was secreting at a low rate, but this increase was of short duration and demanded a sensitive recording device. The cholinergic stimulation causes the gland to secrete and also increases the resistance to the flow in the duct by luminal narrowing and by changes of the fluidity of the pancreatic juice. These seemingly opposite effects may be explained by the small amount of pancreatic juice that joins the secreted or perfused juice in the duct and an increase in resistance is overcome by an increase in pressure. Thus no retardation is observed. When the duct is perfused at constant pressure the secreting pressure is too small, resistance builds up and retardation is noted.

5532 THE CEPHALIC PHASE OF PANCREATIC SECRETION IN MAN. (E.) Novis, B. H. (Groote Schuur Hosp., Cape Town, South Africa), S. Bank and I. N. Marks. *Scand. J. Gastroenterol.* 6(5): 417-421, 1971.

The effect of sham-feeding on pancreatic secretion was studied in 5 patients with achlorhydria to determine the existence of a cephalic phase of pancreatic secretion in man. In all 5 patients, sham-feeding was followed by an increase in trypsin (35-66%), lipase (16-50%), and chymotrypsin (25-60%) concentrations over basal levels. Amylase concentration was variable. The contamination of the pancreatic fluid by bile was unavoidable; however, there was no constant effect on enzyme secretion. The mean trypsin (13-40%) and lipase (10-75%) outputs were higher after sham-feeding stimulation in all 5 patients; however, chymotrypsin and amylase outputs were more variable. Sham-feeding seemingly produces a highly concentrated pancreatic juice indicating the existence of a cephalic phase.

5533 THE EFFECT OF EXOGENOUS AND ENDOGENOUS SECRETIN AND CHOLECYSTOKININ ON PANCREATIC SECRETION IN CATS. (E.) Konturek, S. J. (Med. Acad. Inst. Physiol., Cracow, Poland), T. Radecki, E. Mikos and J. Thor. *Scand. J. Gastroenterol.* 6(5):423-428, 1971.

The effects of exogenous and endogenous secretin and cholecystokinin (CCK) given alone or in combination on pancreatic secretion was studied in cats with gastric and pancreatic fistulas. The mean maximal volume flow and bicarbonate output in response to infusion of graded doses of pure natural secretin was achieved at a dose of 4 U/kg/hr. I.v. administration of CCK (1-32 U/kg/hr) did not elicit a measurable pancreatic response. CCK infused with secretin (0.5 U/kg/hr) produced a dose-related volume and bicarbonate output with the maximum occurring at 16 U/kg/hr. Infusion of 0.1 N HCl (0.25 - 4 mEq/hr) into the duodenum resulted in an increase in pancreatic secretion reaching a maximum at the rate of 2 mEq/hr of acid. The highest pancreatic response to duodenal acidification was about 15% lower than the maximum achieved with the exogenous secretin. The same response was observed when CCK was infused i.v. with duodenal acidification at the rate of 0.5 mEq/hr of acid. Infusion of L-phenylalanine (10-80 ml/hr) combined with acid (0.5 mEq/hr) or with i.v. secretin (0.5 U/kg/hr) resulted in the progressive increase in pancreatic flow rate and bicarbonate output. However, when infused alone there was no increase in pancreatic secretion. Secretin and CCK seemingly show synergism in stimulating pancreatic secretion.

5534 ISOLATION AND PURIFICATION OF THE SECRETORY TRYPSIN INHIBITOR FROM THE PANCREAS OF THE CAT. (Ger.) Tschesche, H. (Tech. U. Organ. Chem. Lab., Munich, Germany) and S. Kupfer. *Hoppe Seylers Z. Physiol. Chem.* 352(5): 764-766, 1971.

The procedure of isolation and purification using a combination of gel filtration, affinity chromatography on water insoluble trypsin resin and ion-exchange chromatography is described. pH gradient elution on SE-Sephadex C-25 of the crude preparation resulted in the separation of 7 trypsin and BAPNA (N^{α}-benzyol-DL-arginine-p-nitroanilide)-inhibiting fractions. Six of these (B-G) were modified inhibitors containing the same or usually less amino acids than the main and last basic fraction (H) which constituted the native protein with the complete polypeptide chain. It is composed of 56 amino acid residues per molecule: Asp_6, Thr_3, Ser_4, Glu_6, Pro_4, Gly$_4$, Ala$_2$, Val$_3$, Cys$_6$, Ile$_3$, Leu$_5$, Tyr$_2$, Lys$_6$, Arg$_2$. None of the active fractions contained Met, Phe, His, and Trp. All fractions could be inactivated by reactions with terminal amino group blocking reagents such as maleic acid anhydride or isothiocyanates indicating that the trypsin inhibitor of the cat, just like that of the pig, (reported earlier) contains a lysine residue at the reactive site.

5535 THE DEMONSTRATION OF GLYCOGEN IN THE EXOCRINE PANCREAS OF THE DOG. (Fr.) Frexinos, J. (Purpan Hosp., Toulouse, France) and A. Ribet. *Ann. Histochim.* 15(4):321-326, 1970.

5536 PANCREATIC FUNCTION TESTS. (E.) Gallagher, N. D. (U. Sydney Dept. Med., Australia). *Aust. NZ J. Med.* 1(2):201-202, 1971.

5537 FUNCTION, BIOSYNTHESIS, SECRETION AND INTESTINAL DEGRADATION OF A PANCREATIC HYDROLASE: THE LIPASE OF THE RAT EXOCRINE PANCREAS. (E.) Christophe, J. (U. Brussels Med. Sch., Belgium), A. Vandermeers and P. Robberecht. *Rev. Eur. Etud. Clin. Biol.* 16(2):108-116, 1971.

See also numbers: 5450, 5451, 5436, 5505, 5552, 5596, 5610, 5871, 6035

HEPATOBILIARY TRACT

5538 EFFECTS OF CARBON TETRACHLORIDE ON THE METABOLISM OF LIVER GLYCOGEN IN THE RAT. (E.) Hickenbottom, R. S. and K. R. Hornbrook (Emory U. Dept. Pharmacol., Atlanta, Ga.). *J. Pharmacol. Exp. Ther.* 178(2):383-394, 1971.

The effects of CCl_4 (200 ml/kg i.p.) on the metabolism of liver glycogen was studied in starved rats and rats pretreated with nicotinamide. The accumulation of glycogen in livers of rats given CCl4 3,6, or 12 hr previously was approximately 50% of that found in control rats, and at 24 hr was only 17% of control values. Three hr after refeeding, glycogen was increased in livers of both groups of rats, but the increase was 4-fold greater in livers of control rats. Both the activity of the I-form (measured without added glucose-6-phosphatase) of glycogen transferase and the total activity of this enzyme were decreased after CCl_4, the present decrease being greater in the former. Livers of CCl_4-treated rats had lower concentrations of ATP, uridine diphosphate-glucose and glucose, but higher concentrations of glucose-6-phosphatase, lactate and pyruvate, than those found in livers of control rats. Neither adrenal demedullation nor hydrocortisone pretreatment appreciably altered the response to CCl4. Although nicotinamide substantially prevented the morphological effects of CCl4 on the liver, it did not modify either the hepatic glycogen metabolism or the changes in concentrations of metabolites found after CCl4 treatment. CCl4 treatment caused decreases in the activities of glycogen transferase and of phosphorylase which were first noted after 12 hr and were marked 24 hr after CCl4 administration. While cycloheximide caused a decrease in phosphorylase phosphatase activity 12 hr after treatment, no effect on transferase phosphatase activity was observed. Thus, CCl_4 seems to exert its effects on glycogen metabolism by causing a decrease in the activity of glycogen transferase phosphatase and phosphorylase phosphatase.

5539 LOSS OF THE PROLIFERATIVE CAPACITY OF LIVER CELLS AFTER PARTIAL HEPATECTOMY. (Ger.) Tuczek, H. V. (Univ. Pathol. Inst., Munich, Germany) and H. Rabes. *Experientia* 27(5):526, 1971.

About 90% of the liver, excluding the papillary process, was removed from 83 male Sprague-Dawley rats. Of these animals, 66 (79.5%) died postoperatively. Autoradiographic studies with ^{3}H-thymidine performed in survivors who were sacrificed 19-40 hr after surgery demonstrated that compensatory proliferation of the remaining parenchyma did not occur. The labeling index was lower than in control rats, and no evidence of mitosis was found. Eosinophilic inclusions were found in the cytoplasm. These changes have been previously described in liver damage as intracellular droplets of protein, areas of degeneration, or localized cytoplasmic necrosis. Possible causes of impaired proliferation are circulatory or toxic changes in the liver or inhibition of preproliferative synthesis, DNA replication, and mitosis due to metabolic changes caused by increased functional stress.

5540 ALTERATIONS IN HEPATIC ENZYME ACTIVITIES DUE TO COLD EXPOSURE RATHER THAN CHANGES IN DIET. (E.) Morrison, G. R.

(Washington U. Sch. Med., St. Louis, Mo.) and F. E. Brock. *Am. J. Physiol.* 221(2):449-452, 1971.

Hepatic enzymes participating in the intermediary metabolism of carbohydrates were measured in 24 Sprague-Dawley rats to investigate the effects of chronic cold exposure. Cold-acclimated rats (4°C) showed increased activities of rate-limiting enzymes for gluconeogenesis (glucose-6-phosphatase, fructose diphosphatase) and glycogenesis (glycogen synthetase), but a decrease in glucose-6-phosphate dehydrogenase, when compared with warm-acclimated (24°C) rats. Glycogen and lipid concentrations were significantly less in the livers of cold-acclimated rats. Since the cold- and warm-acclimated rats consumed the same amount of a 40% protein diet ad libitum (16.0 g/day), differences between hepatic enzyme activities in the 2 groups apparently was related to nonshivering thermogenesis per se.

5541 HYPERLIPEMIA IN THE GERBIL: EFFECT OF DIET ON HEPATIC LIPOGENESIS. (E.) Seiler, M. W. (Harvard Sch. Public Health, Boston, Mass.), M. A. Hamilton, V. Lauris, M. G. Herrera and D. M. Hegsted. *Am. J. Physiol.* 221(2): 554-558, 1971.

The effect of a high carbohydrate diet and 2 other diets (containing similar levels of either safflower or coconut oil) on glucose utilization and glucose incorporation into liver and perfusate lipoprotein lipids was studied in isolated, perfused gerbil livers. Livers from carbohydrate and coconut groups utilized more glucose and incorporated more glucose-^{14}C into tissue and perfusate lipids than those from the safflower group. Close to 90% of the label incorporated into total lipids in the liver or the perfusate was recovered either as phospholipid or as triglyceride. Similar results were found when liver slices were used. The rate of labeled acetate incorporation into total lipid by prepared liver mitochondrial supernatant was significantly higher in the carbohydrate and coconut groups than in the safflower group. Feeding unsaturated fat to the gerbil apparently is more effective than saturated fat in reducing hepatic lipogenesis, this effect perhaps being mediated in part by a reduction of hepatic glucokinase.

5542 METABOLISM OF VOLATILE FATTY ACIDS BY LIVER AND PORTAL-DRAINED VISCERA IN SHEEP. (E.) Bergman, E. N. (New York State Vet. Coll., Ithaca) and J. E. Wolff. *Am. J. Physiol.* 221(2):586-592, 1971.

Blood flow measurements and arteriovenous concentration differences were used to determine net appearance in portal blood and net hepatic utilization of volatile fatty acids (acetic, propionic, and butyric acids). Simultaneously, acetate-2-^{14}C was infused to measure total body turnover and blood acetate utilization and production by liver and portal-drained viscera in sheep. Following continuous feeding of alfalfa pellets (800 g/day), mean net rates of appearance in portal blood were 68, 18 and 2 mM/hr for acetate, propionate and butyrate. These values were reduced to 3, 0.8 and 0.6 mM/hr after 3 days of fasting. Large and variable amounts of acetate-2-^{14}C were removed in passage of arterial blood through the portal-drained viscera (mean; 32-34% in fed and fasted sheep) and this corresponded to a mean utilization of 29 and 7 mM/hr resp. Portal acetate absorption rates were higher (97 mM/hr) in the fed animals than in the fasted (10 mM/hr) animals; these values accounted for 76 and 22% resp., of the whole body acetate turnover and thus implied a large endogenous acetate production. Unlike proprionate and butyrate, where 80-100% were metabolized by the liver, only a small percentage of acetate was metabolized. Substantial fractions of all 3 volatile fatty acids produced in the rumen are metabolized during absorption and never do reach the bloodstream.

5543 THE INFLUENCE OF STARVATION UPON HEPATIC DRUG METABOLISM IN RATS, MICE, AND GUINEA PIGS. (E.) Furner, R. L. (NASA Ames Res. Ctr., Moffett Field, Calif.) and D. D. Feller. *Proc. Soc. Exp. Biol. Med.* 137(3): 816-819, 1971.

After 3 days starvation rats, mice, and guinea pigs lost 35, 25 and 18%, resp. of their original body weights. All 3 species groups which had been starved 1 day had approximately 40% less total liver weight than controls. Total liver weight in rats only continued to decline between 1 and 3 days of starvation. Aniline metabolism was elevated maximally after 2 days starvation in all 3 species; however at 3 days aniline metabolism in the rat had declined to control levels. Starvation elevated the metabolism of p-nitroanisole in rats and mice, but not in guinea pigs after 2 days. In rats, p-nitroanisole metabolism at 3 days decreased and approached control values. Ethylmorphine metabolism was stimulated by starvation only in mice, and was depressed in guinea pigs after 1 day of starvation and in rats after 3 days of starvation. Enzymes responsible for oxidative metabolism of certain drugs are not interdependent since aniline metabolism in rats increases and then decreases, while ethylmorphine metabolism only decreases. These enzymes are apparently also species-dependent.

5544 ACTIVATION OF THE PROTEIN SYNTHETIC CAPACITY OF RAT LIVER CELL SAP BY AMINO-ACIDS. (E.) Clemens, M. J. (U. Sussex Sch. Biol. Sci., England) and A. Korner. *Nature [New Biol.] (Lond.)* 232(34):252-253, 1971.

The ability of cell-free systems to incorporate amino acids into acid-insoluble material in vitro was studied using rat liver incubated in various concentrations of amino acids. Post-mitochondrial supernatants obtained from liver slices which had been incubated in 6 times the normal plasma level of amino acids exhibited an enhanced ability to incorporate phenylalanine into polypeptide in vitro. This enhancement was independent of RNA or protein synthesis in the incubated slices. There were no corresponding changes in the ability of ribosomes prepared from liver slices to incorporate labeled amino acid in vitro. Cell sap obtained from liver slices which were incubated in an amino acid mixture 6 times the normal plasma levels was 50% more active than that from slices incubated in low levels of amino acids at catalyzing phenylalanine incorporation by ribosomes from unincubated liver under conditions where cell sap was limiting. This occurred whether or not polyuridylic acid was added to the cell-free system.

5545 BIOCHEMICAL EVALUATION OF HEPATIC PRESERVATION TECHNIQUES IN THE ISOLATED RAT LIVER. (E.) Draz, S. (UCLA Sch. Med., Los Angeles, Calif.), R. Minami, J. Byfield and E. W. Fonkalsrud. *Surgery* 70(3):446-451, 1971.

The amount of acid phosphatase, β-glucuronidase, and SGPT liberated in the hepatic venous effluent; the amount of hepatic weight gain; the microscopic appearance of hepatic cellular structure; are the criteria by which the efficacy of the techniques is evaluated. Intermittent flushing of the preparation with buffered Ringer's lactate at 37°C and at 2° C is compared to continuous perfusion at these same temperatures. The beneficial effects of hypothermia and the use of buffered perfusate solution were confirmed. It appears that SGPT is released in greater amounts from ischemic liver when there is accompanying acidosis. Chlorpromazine and dibenzylene, membrane-stabilizing drugs, are studied for their hepatic preservative ability. Both drugs substantially reduced the intracellular enzymatic liberation from the perfused livers.

5546 HYPERBILIRUBINEMIA OF FASTING. (E.) Barrett, P. V. D. (Harbor Gen. Hosp., Torrance, Calif.). *JAMA* 217(10):1349-1353, 1971.

Serum bilirubin levels were measured after a 44-48-hr fast in 5 normal patients and 5 patients with hepatic dysfunction and the serum bilirubin diurnal rhythm was determined before and after nocturnal feedings. Serum bilirubin concentration increased 5 to 10 hr after the last meal, increased throughout the study, and decreased as early as 2 hr after feeding. Prolonged fasting (110 hr) was studied in 1 normal patient whose total serum bilirubin rose to 326% of control levels after 63 hr and decreased to 206% of control values for the remainder of the fast. The absolute increase in bilirubin concentration in fasting varied with the initial bilirubin level, but the percentage increase of normal subjects and patients with liver disorders was not significantly different. The diurnal rhythm of serum bilirubin was abolished by frequent night feedings. Fasting for 48 hr seemingly causes a 2-fold increase in serum bilirubin and overnight fasting is responsible for diurnal fluctuations. The hyperbilirubinemia of fasting seems to be caused by diminished bilirubin clearance by the liver and may be important in jaundice associated with hyperemesis gravidarum or congenital pyloric stenosis.

5547 THE ACTION OF DRUGS ON BILIRUBIN METABOLISM IN MAN. (E.) Billing, B. H. (Roy. Free Hosp., London) and M. Black. *Ann. NY Acad. Sci.* 179:403-410, 1971.

A large number of drugs not classified as true hepatotoxins have been implicated as causing jaundice. Most drugs are dangerous only in a few susceptible individuals. Chemical structure cannot be used to predict a potentially toxic drug and these drugs seem to be dose independent. Levels of cyctochrome P450 as a reference enzyme and bilirubin conjugation in liver slices were used to determine glucuronyl transferase activity. Twenty-six patients who had received no medication for 30 days prior to surgery evidenced 1.41 ± 0.68 mg bilirubin conjugated /g liver/hr. Twenty-eight who had received phenobarbital for 1 week prior to surgery had 2.03 ± 0.88 mg and 24 patients who had received other medication, 3.0 ± 1.2 mg. Glutethimide gave the highest amount of conjugated bilirubin in this last group. Glutethimide and phenobarbital were used on patients with Gilbert's syndrome; conjugation activity increased.

5548 REGULATION OF HEPATIC CHOLESTEROL BIOSYNTHESIS BY CLOFIBRATE ADMINISTRATION. (E.) White, L. W. (Case Western Reserve U. Sch. Med., Cleveland). *J. Pharmacol. Exp. Ther.* 178(2):361-370, 1971.

Male Sprague-Dawley rats were fed a Purina rat pellet diet with or without addition of 0.3% clofibrate. Clofibrate-treated rats were sacrificed at 1-18 days at which time slices or homogenate fractions of liver were prepared. Liver slices from these animals showed a decreased level of incorporation of ^{14}C-labeled pyruvate or acetate into cholesterol or mevalonate. There was no effect on the metabolic steps between mevalonate and cholesterol, nor was there any effect on the amount of label going into CO_2 or into fatty acids. There was a decrease in incorporation of ^{14}C-labeled acetate, acetyl-CoA and 3-hydroxy-3-methylglutaryl-CoA into mevalonate, but the 3-hydroxy-3-methylglutaryl condensing enzyme was not affected. It was concluded that clofibrate regulates hepatic cholesterol synthesis through its inhibition of the reduction of 3-hydroxy-3-methylglutaryl-CoA to mevalonate by hepatic microsomes.

5549 SOURCE OF THE HUMORAL FACTOR THAT INITIATES HEPATIC REGENERATION. (E.)

Levi, J. U. (U. Miami Sch. Med., Fla.) and R. Zeppa. *Ann. Surg.* 174(3):364-370, 1971.

The source of a humoral factor that may initiate and control hepatic regeneration was examined on 42 hepatectomized male rats using cross-circulated, isolated (*in situ*) perfusion studies. Normal rat liver showed a marked increase (200-500%) in liver DNA incorporation of (Methyl-^{3}H)-Thymidine when cross-circulated with livers partially hepatectomized 18 and 24 hours but not at 0,6, and 12 hours before the perfusion. Livers subjected to a sham operation at 0, 6, 12, 18, or 24 hours prior to the perfusion showed no change in incorporation. Similar increases of (methyl-^{3}H)-thymidine incorporation into liver DNA were observed in the single isolated rat livers perfused with reconstituted perfusate (stored at -70°C) taken from perfused livers partially hepatectomized 24 hr prior to this experiment. Again no incorporation change was found in the sham operated controls. The resected liver seems to be not only the target of a humoral agent effective in DNA synthesis (an initial step in liver regeneration) but also the source of its production in a closed-loop system, and chronically high levels of this humoral factor may explain the high incidence of hepatomas in cirrhotic patients.

5550 REPEATED ESTIMATION OF LIVER CHOLESTEROL SYNTHESIS *IN VIVO*, USING THE INHIBITOR AY-9944. (E.)

Horton, B. J. (U. Adelaide Waite Agric. Res. Inst., Australia), J. D. Horton and J. R. Sabine. *Biochim. Biophys. Acta* 239(3): 475-481, 1971.

The usefulness of assaying liver cholesterol synthesis *in vivo* using the inhibitor *trans*-1,4-bis(2-chlorobenzylaminomethyl)cyclohexane dihydrochloride (AY-9944) as compared to the *in vitro* liver slice assay was examined in male hooded Wistar rats. Maximal inhibition of blood 7-dehydrocholesterol for the 24-hr period was achieved with 20 µmoles/kg of AY-9944 (by stomach tube) while 10 µmoles/kg gave incomplete inhibition. Both *in vivo* and *in vitro* assays performed on rats fed diets that alter hepatic cholesterol synthesis showed similar results. The correlation between the 2 assays system was significantly high (r=0.833). Rats treated with AY-9944 at either 6 a.m. or 6 p.m. and assayed *in vivo* at 12 and 24 hr showed a marked diurnal rhythm of cholesterol synthesis with the highest increase occurring at night. 20 µmoles/kg AY-9944 were used to insure complete inhibition throughout the diurnal rhythm test period. Repeated assays on the same animals fed cholesterol for the last 2 days of each alternate week for 5 weeks clearly showed inhibition of cholesterol synthesis by cholesterol feeding and indicated the consistent synthesis by each rat from week to week. The inhibition of the conversion of 7-dehydrocholesterol to cholesterol by AY-9944 and subsequent rise of cholesterol levels in tissue and plasma served as a valid assay for liver cholesterogenesis as compared to the *in vitro* liver slice assay and was useful in determining the diurnal rhythm of hepatic cholesterol synthesis as well as repeated assays on the same animal.

5551 THE DIPHASIC ACTION OF HALOTHANE ON THE OXIDATIVE METABOLISM OF DRUGS IN THE LIVER: AN *IN-VITRO* STUDY IN THE RAT. (E.)

Brown, B. R., Jr. (Harvard Med. Sch., Boston, Mass.). *Anesthesiology* 35(3):241-246, 1971.

The effect of halothane on the *in vitro* biotransformation of several drugs by the mixed-function oxidase enzymes of male Sprague-Dawley rates was studied. Halothane (1.8 x 10^{-3} M) decreased the rate of oxidation of hexobarbital, amobarbital, and pentobarbital as well as the demethylation of aminopyrine (Type I drugs) and effects were dose-dependent and reversible. Increasing concentrations of hexobarbital (the prototype of these drugs) did not decrease the depressant action of halothane which indicated its noncompetative action. Halothane increased the hydroxylation of aniline (Type II drug) to *p*-aminophenol in dose-dependent and oxygen-concentration-dependent fashion but was inhibited by aniline concentrations exceeding 3 x 10^{-3}M. Additive effects on aniline metabolism were seen with low concentrations of acetone combined with halothane while larger amounts of acetone decreased the halothane effect. Hydroxylation of zoxazolamine and acetanilide were not significantly increased by the addition of halothane except at high halothane concentrations in the case of acetanilide. These effects may represent an action of halothane on the terminal oxidase of the hepatic microsomal oxidation system, cytochrome P-450, and the noncompetative depression of these drugs argues against limitation of access to active sites as a primary mechanism of halothane action on these hepatic enzyme systems.

5552 EARLY CHANGES IN THE LEVELS OF LIVER GLYCOLYTIC ENZYMES AFTER TOTAL PANCREATECTOMY IN THE RAT. (E.)

Migliorini, R. H. (Sch. Med., Sao Paulo, Brazil). *Biochim. Biophys. Acta* 244(1):125-128, 1971.

The effect of total pancreatectomy on liver glycolytic enzymes was studied in female Wistar rats within the first 24 hr after surgery. Blood sugar and free fatty acid levels increased rapidly after the operation. Of the enzymes studied glucokinase showed the most marked changes, its activity decreasing to 57% of initial values 4 hr after pancreatectomy and attaining 44% of control values at 24 hr. No change in hexokinase activity was observed. Phosphofructokinase activity also declined, but more slowly than glucokinase, its activity 4 and 14 hr after pancreatectomy being 80 and 68% of the initial value, resp. Pyruvate kinase activity did not change appreciably within the first 24 hr after removal of the pancreas.

5553 NATRIURESIS AFTER OCCLUSION OF THE HEPATIC ARTERY AND PORTAL VEIN. (E.) Mullane, J. F. (Walter Reed Army Inst. Res., Washington, D. C.) and E. O. Yhap. *J. Surg. Res.* 11(9):441-446, 1971.

The renal response to a saline load was studied in dogs after occlusion of the hepatic artery and portal vein to determine the effect of loss of hepatic function on the renal excretion of sodium. When compared with sham operated controls (manipulation of the hepatic artery and portal vein) the experimental animals showed no differences for creatinine clearance, plasma sodium, potassium excretion, arterial systolic pressure and plasma lactate. However, sham operated controls did show significant increases in urine flow rate, total and fractional sodium excretion and plasma potassium when compared with operated dogs. In experimental animals the observed change in filtered sodium correlated well with the change in urinary sodium excretion (r = 0.87), while in controls no direct relationship was present. Renal sodium excretion seems to be influenced by the absence of the liver and may therefore be of significance for sodium retention with liver disease.

5554 METABOLIC CONSEQUENCES OF PORTACAVAL SHUNTING IN THE RAT: EFFECTS ON GLUCOSE TOLERANCE AND SERUM IMMUNOREACTIVE INSULIN RESPONSE. (E.) Assal, J. P. (U. Geneva Inst. Clin. Biochem., Switzerland), R. Levrat, W. Stauffacher and A. E. Renold. *Metabolism* 20(9): 850-858, 1971.

The effects of complete portacaval shunting (PCS) on glucose tolerance, on the response of serum immunoreactive insulin (IRI) and on hepatic glycogen were studied in rats 5 days and 3 months postoperatively. Neither p.o. nor i.v. glucose tolerance was altered on the 5th day or 3rd month after surgery. After 15 hr of fasting there was no initially significant increase in serum IRI in PCS animals at either postoperative study. However, in response to oral glucose the serum IRI was markedly exaggerated in both follow-up studies. I.v. glucose was without effect on the serum IRI response. After 15 hr of fasting, hepatic glycogen levels were similar in PCS animals and controls. In response to oral glucose operated animals showed a significantly smaller increase in hepatic glycogen than did unoperated controls. Following the oral administration of glucose to PCS animals there may be an increase in the release of a gastrointestinal factor which stimulates insulin release or potentiates the insulin-releasing effect of glucose.

5555 THE EFFECT OF INHALATION OF HALOGENATED ANESTHETICS ON RAT LIVER MITOCHONDRIAL FUNCTION. (E.) Schumer, W. (VA West Side Hosp. Chicago, Ill.), P. R. Erve, R. P. Obernolt, C. T. Bombeck and M. S. Sadove. *Anesthesiology* 35(3):253-255, 1971.

The performance of isolated liver mitochondria obtained from rats immediately following inhalation anesthesia with halothane was studied. Exposure to 3 or 5% halothane was followed by a 2-fold increase in the rate of oxygen uptake by liver mitochondria both in the presence and absence of ADP. However, exposure to 1% halothane did not affect the rate of respiration. Halothane anesthesia did not alter the respiratory control ratio or the ADP to oxygen ratio indicating no impairment of liver mitochondrial function. Electron micrographs revealed no detectable differences between the ultrastructural appearances of mitochondria derived from control animal livers and those from halothane-anesthetized animals. While trifluoroethyl-vinyl ether (fluroxene) had the same effect as halothane on respiration, neither methoxyflurane nor diethyl ether produced any increase in the rate of respiration.

5556 POLYAMINE METABOLISM IN MOUSE LIVER AFTER PARTIAL HEPATECTOMY. (E.) Russell, D. H. (NCI Baltimore Cancer Res. Ctr., Md.) and T. A. McVicker. *Biochim. Biophys. Acta* 244(1):85-93, 1971.

The correlation between polyamine synthesis and accumulation and RNA accumulation in the mouse liver after partial hepatectomy, and the turnover of the spermidine pool in both normal and regenerating mouse livers were studied. Ornithine decarboxylase activity had changed little 24 hr following partial hepatectomy but was about 4-fold higher than sham-operated controls within 36 hr. 5-Adenosyl-L-methionine decarboxylase activity increased gradually and reached a level of double that of controls within 48 hr. Within 24 hr after surgery, putrescine concentration was 50% above sham-operated controls and remained elevated, maximal levels being detected 3 days after hepatectomy as were maximal RNA levels. Within 4 days, the spermidine pool was elevated 3-fold above controls and it remained elevated up to 6 days postoperatively. Spermine levels dropped to 70% of controls within 72 hr but returned to normal in 6-8 days. In normal mouse liver there seemed to be a fast- and a slow-turning-over spermidine pool, the half-lives of which were 1.5 days and 10 days, resp. In the regenerating mouse liver, one spermidine pool with a half-life of 2 days was observed.

5557 INTERPRETATION OF PLASMA BILIRUBIN LEVELS BASED ON STUDIES WITH RADIOACTIVE BILIRUBIN. (E.) Bloomer, J. R. (NIH, Bethesda, Md.), P. D. Berk, R. B. Howe and N. I. Berlin. *JAMA* 218(2):216-220, 1971.

The plasma unconjugated bilirubin concentration (Br) represents a balance between bilirubin production rate (BRP) and hepatic bilirubin clearance (C_{Br}). If any 2 of these 3 measurements of bilirubin metabolism are known, the third can be calculated (Br = BRP + C_{Br}). Using measured values of C_{Br} and BRP in 37 normal individuals, a distribution function for the normal Br was calculated. Of a normal population 99% will have a concentration less than 1.0 mg/100 ml. Anyone with a concentration greater than that had bilirubin overproduction and/or abnormal clearance, as was observed in many of the patients with hyperbilirubinemia (Gilbert's syndrome, Crigler-Najjar syndrome). If Br exceeds 3.5 mg/100 ml, C_{Br} will usually be abnormal. A change in Br means that either bilirubin production or hepatic function has been altered, even if Br remains within the normal range, an appreciation of which may increase early detection of hepatic damage following hepatotoxic drug administration.

5558 CELL PROLIFERATION IN THE PARTIALLY RESECTED RAT LIVER AFTER ACUTE INTOXICATION BY ALLYL FORMATE. (Ger.) Rabes, H. (U. Munich Inst. Pathol., Germany) and H. V. Tuczek. *Beitr. Pathol. Anat.* 143(1):14-28, 1971.

Destruction of the peripheral parts of the hepatic lobe by i.p. administration of allyl formate (1.0 ml of a 0.7% solution/100 g) to Sprague Dawley rats 3 hr prior to 2/3 hepatectomy changed the proliferation kinetics of the liver. Autoradiography 1 hr after i.p. injection of labeled thymidine administered at intervals 19-71 hr after surgery revealed a 6-8 hr delay in the initiation of DNA synthesis compared to nontreated controls. The maximal level of DNA synthesis was reached 26-33 hr after hepatectomy, declined at 40 hr and was again elevated at 55 hr. The first DNA synthesizing cells are located in the intermediary part of the lobule, then DNA synthesis shifts towards the center of the hepatic lobule. During the maximum DNA synthesis 60-80% of hepatocytes in the intermediary or central parts of the lobe in allyl formate-pretreated rats are simultaneously in the S phase; in control animals the labeling index in comparable parts of the liver reaches a maximum of 30%. The second wave of DNA synthesis again involves mainly the intermediary part of the lobule. Proliferating cells begin to accumulate 47 hr after hepatectomy in the surroundings of necrotic areas. It was concluded that after destruction of the peripheral part of the liver by this agent the proliferative activity of intermediary and centrally located hepatocytes increases and exceeds the regenerative power of cells of normal livers. Through the loss of peripheral cells with the shortest G_1 phase a stronger synchronization of the proliferative activity is obtained in the remaining cells.

5559 BILIARY EXCRETION OF [^{14}C]EDROPHONIUM AND ITS GLUCURONIDE CONJUGATE. (E.) Calvey, T. N. (U. Liverpool Dept. Pharmacol. Ther., England) and D. J. Back. *J. Pharm. Pharmacol.* 23(8):642-643, 1971.

5560 UTILIZATION OF EXOGENOUS FREE FATTY ACIDS FOR THE PRODUCTION OF VERY LOW DENSITY LIPOPROTEIN TRIGLYCERIDE BY LIVERS OF CARBOHYDRATE-FED RATS. (E.) Schonfeld, G. (MIT Clinical Res. Ctr., Cambridge, Mass.) and B. Pfleger. *J. Lipid Res.* 12(5):614-621, 1971.

5561 RIBONUCLEOTIDE REDUCTASE IN REGENERATING LIVERS OF B_{12} DEFICIENT RATS. (E.) Gershman, H. (Brandeis U. Dept. Grad. Biochem., Waltham, Mass.), M. Simon and R. H. Abeles. *Biochim. Biophys. Acta* 246(2):169-170, 1971.

5562 GLYCOGENOLYSIS AND GLYCOGEN SYNTHESIS IN A CELL-FREE SYSTEM FROM RAT LIVER. (E.) Scott, R. B. (Med. Coll. Virginia, Richmond) and L. W. Cooper. *Biochem. Biophys. Res. Commun.* 44(5):1071-1076, 1971.

5563 REGENERATION OF LIVER AND KIDNEY. (E.) Bucher, N. L. R. and R. A. Malt. Little, Brown & Co., Boston, 1971, 278 pp. $12.50.

5564 CHANGES IN THE FRUCTOSE 1,6-DIPHOSPHATASE ACTIVITY IN RAT LIVER DURING GESTATION. (Ger.) Lieser, H. (Univ. Gynecol. Clin., Mainz, Germany) and G. H. Rathgen. *Klin. Wochenschr.* 49(16):942-943, 1971.

5565 EFFECT OF UREMIA ON DRUGS WHICH ARE BROKEN DOWN BY RAT LIVER MICROSOMES. (Ger.) Leber, H. W. (Justus Liebig U. Med. Clin., Giessen, Germany), P. Streitzig, M. Kayser and G. Schütterle. *Klin. Wochenschr.* 49(16):944-946, 1971.

5566 THE DEVELOPMENT OF ADENYLATE KINASE IN RAT LIVER. (E.) Hommes, F. A. (U. Groningen Sch. Med., Netherlands), A. R. Richters and A. Beere. *Biochim. Biophys. Acta* 230(2):327-329, 1971.

5567 LACTIC DEHYDROGENASE ISOZYME DISTRIBUTION IN VARIOUS TISSUE FRACTIONS OF THE DEVELOPING MAMMALIAN LIVER. (E.) Karlsson, B. W. (U. Lund Inst. Zoophysiol., Sweden) and L. S. Palmer. *Comp. Biochem. Physiol.* 38(2B): 299-308, 1971.

5568 MATHEMATICAL MODELLING OF DIFFUSIBLE SUBSTANCES PASSAGE THROUGH THE HEPATIC SINUSOID AND LIVER STATIONARY COMPARTMENTS. (E.)

Ristanovic, D. (Med. Sch., Belgrade, Yugoslavia) and K. Kostic. *Yugoslav. Physiol. Pharmacol. Acta* 7(1):121-126, 1971.

5569 EFFECT OF ETHIONINE ON THE CHEMICAL PROPERTIES OF THE BLOOD AND THE LIVER OF DOGS. (Jap.) Kurogochi, Y. (Med. Coll., Nara, Japan), S. Tanino and T. Nakashima. *Nara Igaku Zasshi (J. Nara Med. Assoc.)* 21(4):423-425, 1970.

5570 HEMORRHAGIC SHOCK AND PROTEINASE INHIBITOR. EXPERIMENTAL, BIOCHEMICAL AND HISTOLOGIC STUDY OF THE EFFECTS OF A PROTEINASE INHIBITOR ON THE HEPATIC SHOCK SYNDROME. (Fr.) Botev, S. (Edouard Herriot Hosp., Lyon, France), C. Switalska and M. Barbier. *Biol. Med. (Paris)* 60(1):1-13, 1971.

5571 THE METABOLIC STABILITY OF MESSENGER RNA IN MITOCHONDRIA FROM NORMAL AND REGENERATING LIVER AND TRANSPLANTABLE HEPATOMA. (Rus.) Gaitskhoki, V. S. (Inst. Exp. Med., Leningrad, USSR), O. I. Kisselev, L. S. Rakhimbekova and I. D. Shaposhnikov. *Biokhimiia* 36(1):60-66, 1971.

5572 INHIBITION BY HOMOGENTISIC ACID OF POLYPEPTIDE SYNTHESIS IN RAT LIVER AND BRAIN RIBOSOMAL SYSTEMS. (E.) Peterson, N. A. (Sonoma State Hosp., Eldridge, Calif.), E. Raghupathy and C. M. McKean. *Biochim. Biophys. Acta* 228(1):268-281, 1971.

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5574 EFFECT OF GLUTETHIMIDE (GLUT) ON THE PLASMA CONCENTRATION OF UNCONJUGATED BILIRUBIN (UCBR). (E.) Berk, P. D. (NIH, Bethesda, Md.) and T. Blaschke. *Clin. Res.* 19(2):347, 1971.

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5600 EFFECTS OF CAERULEIN ON THE HUMAN BILIARY TRACT. (E.) Carratù, R. (Univ. 2nd Med. Clin., Rome), G. Arcangeli and F. Pallone. *R. C. Rom. Gastroenterol.* 3(1): 28-33, 1971.

See also numbers: 5404, 5451, 5529, 5655, 6064, 6076

5601 STIMULATION OF JEJUNAL ADENYL CYCLASE BY ETHANOL. (E.) Greene, H. L., R. H. Herman (US Army Med. Res. Nutr. Lab., Denver, Colo.) and S. Kraemer. *J. Lab. Clin. Med.* 78(3):336-343, 1971.

The stimulatory effects of short-chain alcohols on adenyl cyclase (AC) which catalyzes the formation of 3',5'-cyclic AMP and ATP were investigated in rat liver, brain, and adipose tissue and in both rat and human intestinal tissue. Ethanol stimulated AC activity to some degree in rat tissues generally, but ethanol and methanol caused more AC activity in rat intestine than did the fluroide ion. Maximal alcohol stimulation occurred in rat liver only after Lubrol WX treatment. Human intestinal AC was stimulated to a lesser degree by ethanol and methanol. Reaction of tissue fractions with ATP formed cyclic 3',5'-cyclic AMP as identified by thin layer chromatography and phosphodiesterase reaction. Cyclic AMP formation was prevented by boiling the AC tissue fraction prior to incubation. No mechanism for alcohol stimulation of AC could be proposed.

5602 SYNTHESIS AND UPTAKE OF 5-HYDROXYTRYPTAMINE BY THE MYENTERIC PLEXUS OF THE GUINEA-PIG ILEUM: A HISTOCHEMICAL STUDY. (E.) Robinson, R. G. and M. D. Gershon (Cornell Med. Coll., New York, N. Y.). *J. Pharmacol. Exp. Ther.* 178(2):311-324, 1971.

The synthesis and uptake of 5-hydroxytryptamine (5-HT) by the myenteric plexus of the guinea pig ileum was studied using formaldehyde-induced fluorescence or radioautography. In the untreated myenteric plexus the adrenergic axons displayed a localized green fluorescence after formaldehyde treatment. Following treatment with reserpine, α-methyl-*p*-tyrosine (α-MPT) or α-methyl-*m*-tyrosine (α-MMT) there was no fluorescence in the plexus indicating a depletion of catecholamines. When plexuses were depleted of catecholamine by reserpine, α-MPT or α-MMT and then treated with pheniprazine, tranylcypromine, or harmaline (monoamine oxidase inhibitors) they showed a yellow fluorescence when treated with formaldehyde vapor. The concentration of 5-HT was increased 4-fold by monoamine oxidase inhibition. Treatment with *p*-chlorophenylalanine (a tryptophan hydroxylase inhibitor) prevented the appearance of this widespread fluorescence pattern; however, 5-hydroxytryptophan had no qualitative effect (but some enhancing effect) on fluorescence. 1-Dihydroxyphenylalanine restored the original fluorescent pattern in adrenergic axons. *In vitro* studies revealed an uptake of norepinephrine by the adrenergic axons, while 5-HT was taken up by other parts of the myenteric plexus as well as these axons. 5-HT is seemingly synthesized in the myenteric plexus.

5603 AN ADAPTIVE CHANGE IN ILEAL Na-K-ATPase ACTIVITY AFTER JEJUNECTOMY OR JEJUNAL TRANSPOSITION. (E.) Tilson, M. D. (Yale U. Sch. Med., New Haven, Conn.) and H. K. Wright. *Surgery* 70(3):421-425, 1971.

The activity of Na-K-activated adenosine triphosphatase (Na-K-ATPase) in segments of ileum was studied in rats with normal, transposed, partially resected, and sham-transposed gastrointestinal tracts. The mean Na-K-ATPase activity of the mucosal homogenates from the ileal remnants after resection was increased 30% over the mean activity in the normal and sham-operated segments of ileum. The mean activity of the transposed segments was increased 58% over the activity of the sham-transposed segments. The mean Mg-ATPase activities for all groups showed no differences. The observed biochemical alterations may augment the compensatory hypertrophy of the small intestine seen following a decrease in the effective absorptive surface by increasing membrane transport.

5604 STUDIES ON ENZYME EXCRETION. II. ROLE OF THE INTESTINE AS AN ORGAN OF EXCRETION. (Ger.) Bär, U. (Med. Tech. Inst., Hannover, Germany) and S. Ohlendorf. *Z. Gesamte Exp. Med.* 154(2):140-150, 1971.

The following enzymes were demonstrated in the lumen, mucous membrane and washings (0.9% NaCl or neomycin sulfate solution) of a segment of the small intestine (jejunum and duodenum) of male Wistar rats: malate dehydrogenase, LDH, glutamate-oxalate transaminase, creatine phosphokinase, glutamate-pyruvate transaminase, glutamate dehydrogenase and aldolase. The enzymatic activity in the washings (collected every 30 min) increased steadily over a 7-hr period reaching approximately 4 times the initial values after 6-7 hr. No increase in enzyme activity was obtained following i.v. injection of LDH, aldolase and glutamate-pyruvate transaminase suggesting that the enzymes found in the lumen of the small intestines are not eliminated from plasma but originate from desquamated epithelial cells. In 3 dogs removal of both small and large intestine and total gastrectomy in 1 caused no delay in clearance from plasma of i.v. injected enzymes. These results indicate that the gastrointestinal tract is not the sole site of enzyme elimination. The mechanism of enzyme catabolism is briefly discussed.

5605 EFFECTS OF DIET ON RAT INTESTINAL SOLUBLE HEXOKINASE AND FRUCTOKINASE ACTIVITIES. (E.) Weiser, M. M. (Harvard Med. Sch., Boston, Mass.), H. Quill and K. J. Isselbacher. *Am. J. Physiol.* 221(3):844-849, 1971.

Diet-related intestinal hexokinase activity, hexokinase isozymes, and fructokinase activity were evaluated on the rat using diethylamino-ethylcellulose chromatography. No etiologic role could be attributed to maladaptive response of these enzymes in disease. The data presented showed no adaptive response of intestinal hexokinase to diet or control of enzyme synthesis but a significant change in activity was apparent when compared to a noncarbohydrate diet. This change was small and was secondary to a local cellular increase in glucose concentration in the actively absorbing cell with no intestinal glucokinase response to diet. Casein noncarbohydrate diets decreased hexokinase activity compared to starved rats. High fructose diets did not increase hexokinase activity while high glucose or high sucrose increased hexokinase activity as compared to casein-fed animals. High glucose or sucrose diets caused a relative increase in jejunal Type II hexokinase over Type I apparently confined to the upper absorbing cells of the villus suggesting a noninductive effect of high-glucose concentrations. Type IV (glucokinase) was not detected. Hexokinase activity was higher in the ileum and fructokinase activity was higher in the jejunum while starved and casein noncarbohydrate fed animals had equally low fructokinase activity. High-carbohydrate diets (glucose, fructose, and sucrose) increased fructokinase activity, especially, high-fructose and -sucrose diets.

5606 CELL POPULATION CHANGES IN THE INTESTINAL MUCOSA OF PROTEIN-DEPLETED OR STARVED RATS. I. CHANGES IN MITOTIC CYCLE TIME. (E.) Rose, P. M. (Rutgers U. Dept. Zool., New Brunswick, N. J.), A. F. Hopper and R. W. Wannemacher, Jr. *J. Cell. Biol.* 50(3):887-892, 1971.

Protein-free diets and progressive starvation effects during the rat ileal crypt cell cycle time was investigated through labeled mitoses. Groups of 25 rats were starved for 7 or 10 days or fed a protein-free diet for 3, 7, or 11 weeks. Controls were fed 18% casein agar gel diet. Progressive protein depletion gave a progressive lengthing of the cycle time because of a lengthened synthetic phase. The presynthetic gap was similar to the controls after 3 weeks but a large variability occurred after 11 weeks. Postsynthetic gap plus mitotic phase duration was not affected by diet. The cell cycle also became more variable as dietary stress increased. The relative duration of the components of the cycle in starved animals changed significantly with the synthetic phase and the postsynthetic gap increasing and the presynthetic gap duration decreasing.

5607 IRRADIATION OF THE G.I. TRACT: COMPENSATORY RESPONSE OF STOMACH, JEJUNUM AND COLON. (E.) Hagemann, R. F. (Allegheny Gen. Hosp., Pittsburgh, Pa.) and S. Lesher. *Br. J. Radiol.* 44(524):599-602, 1971.

With the quotient disintegrations/min (dpm)/labeled crypt nucleus giving a direct measurement of the extent of ^{3}H-thymidine incorporation per S phase cell, results showed an early dose-dependent depression in rat jejunal crypt cell DNA synthesis after whole body irradiation. This was followed by rapid recovery which was complete 20-24 hr after irradiation with 300 and 600 r and by 48 hr following 900 r. The decrease in cellularity seen at 24 hr was related to the extent of cell killing; however some cell division will occur within 24 hr of exposure. Repopulation occurred after all exposures. Although the stomach did not apparently possess the faculty for compensatory response to radiation injury, the jejunum exhibited a marked dose-dependent post-irradiation overshoot in proliferative cellularity reaching a maximum of 2.6 times control 4 days after 1,000 r. Likewise, the colon possessed the capacity for increased cell proliferation following irradiation, 2-3 days later than in the jejunum. Rather large radiation fractions given at 3-4-day intervals may increase the therapeutic ratio where damage to the gastrointestinal tract is critical.

5608 BILE ACID INHIBITION OF THE INTESTINAL MICROFLORA - A FUNCTION FOR SIMPLE BILE ACIDS? (E.) Floch, M. H. (Norwalk Hosp., Conn.), W. Gershengoren, S. Elliott and H. M. Spiro. *Gastroenterology* 61(2):228-233, 1971.

The effect of free and conjugated bile acids on human aerobic and anaerobic intestinal organisms was investigated in vitro. The growth of 15 of 18 strains of intestinal bacteria tested was inhibited by one or more of the bile acids. All strains of anaerobes, some gram-positive aerobes but none of the gram negative aerobes were inhibited by bile acids. In all experiments bacterial growth was completely inhibited at 5 to 10 times the concentration at which initial inhibition was noted, revealing similar curves of inhibitions. Anaerobic Bacteroides, Lactobacillus and Streptococcus were all sensitive to a 0.5% solution of cholic acid. Aerobic and anaerobic streptococci, Bacteroides, and some freshly isolated lactobacci were inhibited by deoxycholic acid. Both taurocholic and glycocholic acids were ineffective in inhibiting the intestinal organisms. Although these in vitro results do not accurately compare to in vivo intraluminal conditions, this study suggests that simple bile acids may be one more mechanism (in addition to gastric acidity and normal peristalsis) which contributes to the control of intestinal bacterial populations.

5609 STUDIES OF PHOSPHATIDE FRACTIONS IN THE SMALL INTESTINES OF MAN BEFORE AND AFTER ADMINISTRATION OF INTERMEDIATE CHAIN TRIGLYCERIDES. (Ger.) Berg, G. (U. Erlangen-Nuremberg Med. Clin., Germany), L. Witzel and U. Troll. *Z. Ernaehrungswiss.* 10(3):157-159, 1971.

Using thin-layer and gas chromatography the individual fatty acids in phosphatide fractions were determined before and 1 hr after administration of 10 g of medium-chain triglycerides (MCT). Lecithin and cholamine fractions were present in the intestines before and after administration of MCT. Fatty acids with a C_{14}, C_{16} and C_{18} chain length were the main components in both. In the lecithin fraction the saturated fatty acids decreased, the unsaturated increased after MCT; in the colamine fraction the saturated and double unsaturated fatty acids increased while the single unsaturated decreased. The results indicate that phosphatides play no essential role during absorption of MCT. There is no incorporation of fatty acids of the intermediate-chain triglyceride into the phosphatide molecule. The MCT molecule because of its small size seems to be able to penetrate the intestinal wall without the participation of other fat fractions. The main function of phosphatides during absorption of normal fats is probably that of emulsifiers.

5610 ACTIVITY OF DISACCHARIDASES IN THE JEJUNUM OF SUBTOTALLY PANCREATECTOMIZED RATS. (Ger.) Böhmer, R. (U. Ulm Intern. Med. Ctr., Germany), K. Rommel, R. Governa and S. Raptis. *Clin. Chim. Acta* 33(1):61-67, 1971.

Maltase, sucrase and lactase activity and the RNA/DNA quotient in the jejunal mucosa of male Wistar rats were determined in vitro, 14, 73, 79, 88, 96 and 120 days after subtotal (95%) pancreatectomy. Statistically significant increase (as compared to normal controls) in the activity of maltase was noted up to 96 days after surgery, of lactase between 73-96 days and of saccharase between 73-120 days. Maltase and lactase activity increased maximally 4-5 fold, saccharase activity 10-fold. The RNA/DNA quotient remained constant suggesting that there was no increase in protein synthesis and number of enzyme molecules. The decrease in enzyme activity 80-90 days after surgery as compared to the increase <90 days after surgery was interpreted as a positive selection of animals since most died from diabetes before 90 days. The reasons for the apparent contradiction of these in vitro results to those obtained in vivo (other reports) are discussed and explained by the 2 type (A and B) monosaccharide transport carriers. The possibilities of influencing hydrolysis and absorption of disaccharides by pancreatectomy are discussed.

5611 INTESTINAL IMMUNOGLOBULINS IN THE PIG. (E.) Bourne, F. J. (U. Bristol Dept. Anim. Husband., England), J. Pickup and J. W. Honour. *Biochim. Biophys. Acta* 229(1):18-25, 1971.

5612 PROLIFERATION KINETICS IN EPITHELIUM OF GUINEA PIG COLON. II. DISTRIBUTION OF PROLIFERATING AND SPECIALIZED CELLS ALONG VARIOUS CRYPTS. (E.) Sawicki, W. (Sch. Med., Warsaw, Poland), J. Rowinski and O. Blaton. *Cell Tissue Kinet.* 4(3):225-232, 1971.

5613 FACTORS INFLUENCING PULMONARY METHANE EXCRETION IN MAN. AN INDIRECT METHOD OF STUDYING THE IN SITU METABOLISM OF THE METHANE-PRODUCING COLONIC BACTERIA. (E.) Bond, J. H., Jr. (U. Minnesota Hosp., Minneapolis), R. R. Engel and M. D. Levitt. *J. Exp. Med.* 133(3):572-588, 1971.

5614 THE EFFECT OF A STRICT VEGETARIAN DIET ON THE FAECAL FLORA AND FAECAL STEROID CONCENTRATION. (E.) Aries, V. C. (St. Mary's Hosp. Med. Sch., London), J. C. Crowther and B. S. Drasar. *J. Pathol.* 103(1):54-56, 1971.

5615 GROWTH AND NUTRITION OF ENTERECTOMIZED RATS FED AN ELEMENTAL LIQUID DIET. (E.) Touloukian, R. J. (Yale U. Sch. Med., New Haven, Conn.), B. Mitruka and C. Hoyle. *Surgery* 69(4):637-645, 1971.

5616 SERUM LEVELS OF INTESTINAL ALKALINE PHOSPHATASE IN RELATION TO SHOCK. (E.) Bounous, G. (Univ. Hosp. Ctr., Sherbrooke, Quebec, Canada) and J. Hugon. *Surgery* 69(2):238-245, 1971.

5617 BILE SALTS, STEROLS, STEROL ESTERS, GLYCERIDES AND FATTY ACIDS IN MICELLAR AND OIL PHASES OF INTESTINAL CONTENTS DURING FAT DIGESTION IN MAN. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.) and M. Siurala. *Z. Klin. Chem. Klin. Biochem.* 9(1):47-52, 1971.

5618 DIETARY REGULATION OF SMALL INTESTINAL ENZYME ACTIVITY IN MAN. (E.) Rosensweig, N. S. (St. Luke's Hosp. Ctr., New York, N. Y.), R. H. Herman and F. B. Stifel. *Am. J. Clin. Nutr.* 24(1):65-69, 1971.

5619 THE CONCEPT OF BRUSH BORDER FUNCTION. OBSERVATIONS ON INTESTINAL EPITHELIUM IN TISSUE CULTURE. (E.) Sandstrom, B. (Univ. Dept. Human Anat., Uppsala, Sweden). *Cytobiologie* 3(2):293-297, 1971.

5620 GLUCAMYLASE ACTIVITY OF HUMAN INTESTINAL MUCOSA. (E.) Auricchio, S. (U. Naples 2nd Dept. Pediatr., Italy), F. Ciccimarra, E. Starace, A. Vegnente, P. Giliberti and L. Provenzale. *R. C. Rom. Gastroenterol.* 3(1):1-8, 1971.

See also numbers: 5452, 5453, 5454

5621 SUPPRESSION OF FOOD INTAKE WITH INTRAGASTRIC LOADING: RELATION TO NATURAL FEEDING CYCLE. (E.) Quatermain, D. (Rockefeller U., New York, N. Y.), H. Kissileff, R. Shapiro and N. E. Miller. *Science* 173(4000):941-943, 1971.

The effect of intragastric loads given in discrete amounts at times corresponding to normal eating habits was studied in 23 rats. Infusion according to the rats' individual eating pattern produced a greater suppression of oral intake (2 to 18% excessive consumption) than a continuous 24-hr slow infusion (30 to 50% excessive consumption) which was not the result of periodic stomach filling. Continuous slow infusions or loads began after eating had progressed were not as effective in suppressing food intake as those loads which anticipated a spontaneous meal. Therefore effective suppression of oral intake seems to depend not only on the total amount of food infused but also on the time of the infusion relative to when the animal is about to eat, and that factors other than total caloric intake may be important in determining satiety and controlling food intake.

5622 STUDY OF THE ARTERIAL AND PORTAL LIVER CIRCULATION WITH A FLOW METER WHICH UTILIZES THE ULTRASONIC DOPPLER EFFECT. PRELIMINARY EXPERIMENTAL RESULTS. (Fr.) Loisance, D., P. Peronneau, M. Pellet and J.-P. Lenriot (Cochin Hosp., Paris). *Presse Med.* 79(27):1227-1230, 1971.

An ultrasonic flow meter was used to measure blood flow in the portal vein and hepatic artery in 10 anesthetized dogs. In the portal vein the rate of blood flow decreased during inspiration while the portal pressure increased. In contrast, blood flow in the hepatic artery did not change much during inspiration but did vary with the rhythm of the heart. Arterial blood flow accounted for 17-32% (mean of 22%) of the hepatic blood flow calculated in 5 dogs from successive measurements made on the hepatic artery and portal vein.

5623 DISCHARGES FROM THE CENTRAL AND PERIPHERAL PARTS OF THE SPLANCHNIC AND VAGUS NERVES DURING CHEMICAL STIMULATION OF THE MUCOSA IN THE SMALL INTESTINE. (Rus.) Imina, L. V. (Inst. Physiol., Minsk, USSR). *Fiziol. Zh. SSSR* 57(1):95-102, 1971.

In chloralose-anesthetized cats discharges from the central and peripheral parts of the splanchnic and vagus nerves were measured before and after instillation of glucose or NaCl (5 ml of 1 or 3 M solutions) into the middle of the small intestine. Instillation of 1 M glucose produced more marked changes in discharges from the splanchnic nerve than in those from the vagus while instillation of 1 M NaCl had the opposite effect. Glucose increased and NaCl decreased the frequency of discharges from the afferent fibers of these nerves. In some cats instillation of 3 M glucose or NaCl increased the frequency of discharges from both the splanchnic and vagus nerves. These findings indicate that either opposite or synergistic reactions occur depending upon the type of stimulant and its concentration.

5624 STUDIES ON THE INTESTINAL VASODILATATION OBSERVED AFTER MECHANICAL STIMULATION OF THE MUCOSA OF THE GUT. (E.) Biber, B. (U. Goteborg Dept. Physiol., Sweden), O. Lundgren and J. Svanvik. *Acta Physiol. Scand.* 82(2): 177-190, 1971.

Weak mechanical stimulation of the feline jejunal mucosa induced a transient increase of total jejunal blood flow amounting to 30-140% of control values. The jejunal vasodilatation was, at least in part, restricted to the mucosal layer. Autonomic denervation or blockade by atropine, α- or β-blocking agents or by a cholinergic ganglionic blocking agent could not abolish the observed blood flow augmentation. However, tetrodotoxin (a nerve conductivity blocking agent), lidocaine (a local anesthetic) and 2-bromo lysergic acid diethylamide (a 5-hydroxytryptamine receptor blocker) all completely abolished the intestinal blood flow augmentation. The above results suggest the involvement of an intramural nervous mechanism that in some way is dependent on 5-hydroxytryptamine release which would, in turn, be responsible for the mechanically evoked intestinal vasodilatation. In some experiments a long-standing jejunal blood flow increase was induced by the administration of bile into the lumen. This type of vasodilatation may be produced by a different mechanism than the vasodilatation observed with mechanical stimulation.

5625 THE EFFECT OF TRUNCAL VAGOTOMY ON JEJUNAL AND ILEAL BLOOD FLOW. (E.) Mackie, D. B. (Cent. Middlesex Hosp., London) and M. D. Turner. *J. Surg. Res.* 11(7):356-363, 1971.

Local jejunal and ileal perfusion rates were measured in 9 unanesthetized dogs both before and after total vagotomy. The mean reduction of ileal and jejunal blood flow between 12 and 17 days following vagotomy was 48 and 49.5%, resp. Hemoglobin, WBC and fasting blood sugar levels were normal. The mean chronic post-vagotomy small intestine perfusion rate did not differ significantly from the mean prevagotomy flow rate. With respect to long-term effects of vagotomy, most animals recover from the reduced blood flow but the exact pattern after the third week is variable. In some animals there may be hyperemia, while in others the return to normal perfusion rates is a more gradual process occurring over many weeks. This study appears to represent the first uninterrupted experiment to assess both the early and long-term effects of vagotomy on mesenteric blood flow in conscious unrestrained animals by a hydrogen gas desaturation method, a blood tissue exchange method based on the same principles as the Kety-Schmidt nitrous oxide method.

5626 CONTINUOUS MEASUREMENT OF STOMACH BLOOD FLOW IN THE DOG BY MEANS OF THERMOCOUPLES. (Ger.) Pinding, M. (Loberstr. 3, Giessen, Germany). *Aerztl. Forsch.* 24(11):331-340, 1970.

Several different experimental arrangements for measuring circulation in the gastric mucosa by recording changes in heat transfer and erythema in restrained and nonrestrained dogs are described. Spontaneous changes in the frequency and amplitude of rhythmic fluctuations in heat transfer values occurred and differed in different dogs. They seemed to be affected more by movement than by emotional stimulation. The pattern of reaction to s.c. inj. of histamine (0.08 mg/kg) or atropine (0.2 mg/kg) differed widely in 2 dogs tested. Reaction to i.v. injection of a variety of compounds was usually most pronounced within the first 5 min causing either an increase or decrease in heat transfer. These differed in different animals and on different days. Histamine, orciprenaline, epinephrine, and carbachol more frequently caused an increase than decrease. Gastrin usually caused a decrease, NaCl, Narcoron (ethylmethylbutylbarbital) and droperidol had no significant effect.

5627 A pH-MEASURING RADIO CAPSULE FOR THE ALIMENTARY CANAL. (E.) Kunz, H. J. (Corning Glass Works, Raleigh, N. C.), T. E. Norby and C. H. Rogers. *Am. J. Dig. Dis.* 16(8): 739-743, 1971.

In a new telemetering system (the Corning Acido Radio Capsule system) designed to measure pH in the gastrointestinal tract, the reference electrode was designed to be self-contained, thereby presenting a sensing system directly in the medium under measurement. A unique antenna configuration assures constant signal pickup for the receiver-recorder readout system. Ten capsules monitored for sensitivity to temperature changes showed that over the range of 32 to 42C, the temperature coefficient was less than 0.05 pH units per degree centigrade. Average response time was less than 1 second, valuable in showing presence or absence of peristaltic action as secreted acid is mixed with less acidic contents of the stomach. There was a linearity of response over the intended useful range (2-7) of pH values. The pH response after 18 hr is still within ±0.2 pH units for measurements at both pH 2 and pH 7. X-ray photographs and fluoroscopic examination demonstrated the ability to locate the capsule in the gastrointestinal tract if desired.

5628 THE INFLUENCE OF RHYTHMIC AND TONIC CONTRACTION OF THE SMALL INTESTINE ON BLOOD FLOW THROUGH THE INTESTINAL SEGMENT. (E.) Semba, T. (U. Hiroshima Sch. Med., Japan), K. Fujii and Y. Fujii. *Jap. J. Physiol.* 21(1): 1-14, 1971.

Contractions of intestinal segments in dogs were found to exert their effects on the arterial and venous blood flow through those segments in 3 distinct patterns. In the contraction phase type, intestinal contraction caused marked augmentation of venous outflow and diminution of arterial inflow. In the relaxation phase type diminution of blood flow was observed in both artery and vein during the contraction period, but during the relaxation period there was augmentation of blood flow. In the combination type, temporal augmentation of blood flow in the vein was followed by diminution of flow during the contraction period, and thereafter was produced again during the relaxation period. Arterial flow changes paralleled those of the venous flow pattern. Augmentation of venous outflow during the contraction period in tonic and rhythmic contraction developed because the blood contained in the visceral wall was expelled into the vein by contraction of the intestinal musculature. Contraction of the musculature caused augmentation of arterial and venous flow during the relaxation period by vasodilation due to prolonged blood vessel compression.

5629 BLOOD AND LYMPH CIRCULATION OF THE LIVER IN EXPERIMENTAL BURN SHOCK. (Rus.) Dorofeev, A. A. (Med. Inst., Dushanbe, USSR). *Arkh. Anat. Gistol. Embriol.* 60(1):68-73, 1971.

5630 GROWTH OF FETAL ORGANS AFTER MATERNAL PARTIAL HEPATECTOMY OR UNILATERAL NEPHRECTOMY. (E.) Skreb, N. (U. Zagreb Inst. Biol., Yugoslavia), Z. Domazet, G. Lukovic and L. Hofman. *Experientia* 27(1):76-77, 1971.

5631 INTESTINAL MICROFLORA OF CHILDREN WITH LAMBLIA INVASION. (Rus.) Gutorova, L. D., V. F. Burmakina and K. N. Klochko. *Med. Parazitol. (Mosk.)* 40(1):72-74, 1971.

5632 THE VASCULAR PATTERN OF HUMAN GASTRIC MUCOSA. (E.) Pace, J. L. (Roy. U. Malta Dept. Anat., Msida). *R. C. Rom. Gastroenterol.* 3(1):9-13, 1971.

See also number: 5470

5633 ASPIRATION BIOPSY OF THE ESOPHAGUS. (Ger.) Arendt, R. (Univ. Med. Clin., Rostock, Germany) and F. Hauzeur. *Dtsch. Z. Verdau. Stoffwechselkr.* 30(5-6):311-317, 1970.

Blind aspiration biopsies of the distal esophagus, performed on 220 patients (59 men and 161 women, aged 16-80 yr), most of whom had gastrointestinal diseases, gave material which could be used in histological diagnosis in 205 cases (93%). Patients with a tendency to bleed, with radiological evidence of esophageal varices, or with clinical findings consistent with chronic liver disease were excluded. Failures were most common among patients who had undergone resection of the cardia and in those who vomited during the procedure. Reflux of gastric juice into the esophagus apparently prevented the esophageal mucosa from being aspirated. Esophagitis, which was present in 48 cases (23%), was found in patients after Billroth II operations (17) and in those with duodenal ulcers (7), functional epigastric disorders (7), hiatus hernia (6), alcoholism (5), pyloric insufficiency and stenotic antral gastritis (4), stomach ulcer (1), and esophageal carcinoma (1). Heart burn was associated with severe, but not with mild, esophagitis.

5634 FURTHER EXPERIENCE WITH DIRECT VISION BRUSHING CYTOLOGY OF MALIGNANT TUMORS OF UPPER GASTROINTESTINAL TRACT. HISTOPATHOLOGIC CORRELATION WITH BIOPSY. (E.) Prolla, J. C. (U. Chicago Dept. Med., Ill.), Y. Yoshii, R. G. Xavier and J. B. Kirsner. *Acta Cytol. (Baltimore)* 15(4):375-378, 1971.

During August 1968 to September 1970 direct vision brushing cytology was performed in 269 patients and biopsy in 209 patients suspected of having upper gastrointestinal cancer. A positive cytodiagnosis was obtained in 90.7% of 54 proven malignant tumors. Three of 215 patients with benign conditions were falsely positive. Positive biopsy results were obtained in 81.5% of 53 malignant tumors. In the 50 cases of malignant tumors of the upper gastrointestinal tract in which both procedures were performed, at least one was positive and in 35 cases both were positive. The main indication for the direct vision techniques is the differential diagnosis of lesions detected by previous roentgenographic and endoscopic examinations. More than 15% of malignant gastric lesions constitute a large group of cancers which appear benign even after endoscopic examination. Brushing cytology and biopsy are of considerable value in the accurate detection of those lesions with a benign gross appearance.

5635 THE GASTRO-CAMERA IN GASTRIC DIAGNOSIS. (E.) Wiendl, H. J. (Tech. U. Munich Clin., Germany). *J. Abdom. Surg.* 13(8):167-173, 1971.

A report of 1,017 examinations with the gastrocamera in 940 patients with various gastrointestinal diseases within the last 4 yr is presented. Main indications for examination with the gastrocamera were: cancer diagnosis, especially early gastric cancer; differential diagnosis between ulcer and ulcerated cancer; follow-up studies in ulcers treated conservatively; gastrointestinal bleeding; diagnosis in resected stomach; judgement and follow-up of polyps; and clearing up of false positive x-ray findings. Of 182 gastric cancers in this series, 14 were early gastric cancer, 86% of which were diagnosed by gastrocamera as compared to 50% diagnosed by x-ray studies. Among 174 patients in which an ulcer or ulcerated cancer had been proven by histological examination, the correct diagnosis with the gastrocamera was possible in 85%. Follow-up of ulcers treated conservatively was better with a gastrocamera than x-ray studies, since ulcer shape is of importance in the healing process. In gastrointestinal hemorrhage, of 103 bleeding sources within the stomach 98 were seen with the gastrocamera, whereas x-rays revealed only 60. In a fairly large number of 159 cases which had had a sure x-ray diagnosis of suspicion of cancer, the gastrocamera examination did not confirm this diagnosis. The selective use of the gastrocamera in combination with x-ray examination may represent a genuine improvement of the diagnosis routine, particularly of surgical diseases of the stomach.

5636 TUBELESS VAGOTOMY AND PYLOROPLASTY AND THE "GASTROGRAFIN TEST". (E.) Davies, N. P. (Gen. Hosp., Birmingham, England) and J. A. Williams. *Am. J. Surg.* 122(3):368-370, 1971.

Of 105 patients 75 had truncal vagotomy and pyloroplasty and 23 had selective vagotomy and pyloroplasty. In 99 patients gastric emptying was satisfactory on the first postoperative day in that 75% of the administered Gastrografin had left the stomach in 1 hr. Of those with normal emptying, 7 patients subsequently had gastrointestinal complications: ileus (4), fatal aspiration pneumonia, gastric gaseous distension, and traumatic esophageal rupture during vagotomy. In 2 of 6 patients who had delayed gastric emptying there were no untoward symptoms and the patients experienced normal thirst with no nausea. Gastrografin findings were ignored and these 2 patients were given fluids orally with no subsequent problems. The Gastrografin test is apparently not necessary for routine management, does not necessarily detect complications (traumatic tears), and may have inherent dangers like possibly inducing ileus in some patients.

5637 DETECTION OF BACTERIAL DECONJUGATION OF BILE SALTS BY A CONVENIENT BREATH-ANALYSIS TECHNIC. (E.) Sherr, H. P. (Johns Hopkins Hosp., Baltimore, Md.), Y. Sasaki, A. Newman, J. C. Banwell, H. N. Wagner, Jr. and T. R. Hendrix. *N. Engl. J. Med.* 285(12):656-661, 1971.

Following oral glycine-1-^{14}C-cholate administration, $^{14}CO_2$ specific activity of expired air was measured by a breath-analysis technic in controls and in patients with steatorrhea, ileal resection or bacterial overgrowth syndromes. In 7 control subjects, the mean total $^{14}CO_2$ excreted in the breath was 2.2±0.60% of the administered dose and ^{14}C-cholic turnover rates were normal (range 4.10 to 6.93 days). Ten patients with steatorrhea unrelated to abnormalities of bile salt metabolism had a similar pattern of $^{14}CO_2$ excretion and ^{14}C-cholic turnover rate. However, 7 patients with ileal resection showed an early rise (18.8%) in $^{14}CO_2$ output and a rapid fall towards control levels within 6 hr. The mean total $^{14}CO_2$ excretion was 31.4±4.6% and increased ^{14}C-cholic turnover rates confirmed that bile salt malabsorption was present. Four patients with bacterial overgrowth in the small intestine had $^{14}CO_2$ excretion curves similar to those seen in patients with ileal resection. Elimination of bacterial overgrowth with antibiotics or surgical fistula repair returned $^{14}CO_2$ excretion levels to normal. Hence, the breath test will detect increased bacterial deconjugation of bile salts and effectively assess the antibiotic management of bacterial overgrowth syndromes.

5638 OBSERVATION OF THE TERMINAL ILEUM. (E.) Nagasako, K. (Tokyo Women's Med. Coll.), C. Yazawa and T. Takemoto. *Endoscopy* 3(1):45-51, 1971.

Normal and pathological conditions of the terminal ileum were studied endoscopically in patients using a flexible fiber colonoscope (FCS). It was necessary to maintain the apical flexibility at the ascending colon for successful insertion of the FCS into the terminal ileum. Removal of the sigmoidal loops was done by pulling the scope to the anal side when the tip of the scope was at the right colon. Three types of configuration were observed at the transverse colon: convex configuration without a loop, concave configuration at the middle part of the transverse colon into the pelvic cavity, and convex configuration with a loop. The convex configuration seemed essential for the FCS to be inserted successfully into the terminal ileum. Endoscopic evaluation of the ileocecal valve allowed classification into labial, papillary and intermediate types which could shift from one type to the other within the same subject. Better visualization of the intestine was accomplished when the valve was papillary or intermediate than when the valve was in the labial form. The tip of the scope was easily passed through the ileocecal valve, allowing for examination of the normal gross and microanatomy (by biopsy) of the terminal ileum. Demonstrable pathological changes were revealed in biopsies taken with the FCS from patients with nonsclerosing ileitis and "backwash ileitis" due to extension of ulcerative colitis.

5639 IS THERE KVEIM RESPONSIVENESS IN CROHN'S DISEASE? (E.) Siltzbach, L. E. (Mt. Sinai Sch. Med., New York, N. Y.), L. O. B. D. Vieira, M. Topilsky and H. D. Janowitz. *Lancet* 2(7725):634-636, 1971.

No microscopically positive Kveim reactions were encountered among the 23 patients with Crohn's disease with either the sarcoid spleen J test material or with the K 12 suspension. Patients with sarcoidosis tested concurrently with the same 2 test materials showed positive test results in 83% and 87% of instances, resp. Patients with nongranulomatous disease all exhibited lack of responsiveness to the 2 sarcoid spleen suspensions. These uniformly negative results are not in accord with recent reports of frequent positive Kveim reactions in patients with Crohn's disease. Closer scrutiny of the specificity of various lots of Kveim test suspensions now in use may be required to explain the discordant results of Kveim testing in patients with Crohn's disease. Fortunately the 2 disorders, sarcoidosis and Crohn's disease, cannot be confused clinically; hence the Kveim test can still be employed to advantage in the specific diagnosis of active sarcoidosis.

5640 BREATH TEST FOR ALTERED BILE-ACID METABOLISM. (E.) Fromm, H. (Med. Sch., Hannover, Germany) and A. F. Hofmann. *Lancet* 2(7725):621-625, 1971.

Increased bacterial deconjugation of bile acids was assessed by measuring $^{14}CO_2$ specific activity of breath samples taken at intervals after a meal containing cholyl-glycine-1-^{14}C (glycocholic acid). All 5 patients with evidence of stasis and bacterial overgrowth in the small intestine showed a striking early increase in $^{14}CO_2$ specific activity; all patients were positive at 2 or 4 hr, and 3 of 5 patients were positive at both. Seventeen of 19 ileal resection patients with severe bile acid malabsorption had a similar early increase in $^{14}CO_2$ specific activity. Measurement of fecal ^{14}C after cholylglycine-1-^{14}C administration distinguished completely bacterial overgrowth from bile acid malabsorption in that it was not increased in any overgrowth cases but was increased in all malabsorption cases, and it allowed detection of bile acid malabsorption in the 5 patients who had negative breath tests at 2 or 4 hr, since fecal ^{14}C was much increased in these cases. Positive breath tests were found in an additional 28 patients with ileal disease, Billroth II gastrectomy or ileal resection; the breath test was negative in patients with hepatic cirrhosis, hypogammaglobulinemia, nontropical sprue, and idiopathic diarrhea. The breath test is a rapid, tubeless outpatient procedure for detecting increased deconjugation of bile acids in intestinal disease.

5641 A SIMPLE AND RAPID THIN-LAYER CHROMATOGRAPHIC METHOD FOR THE ASSAY OF INTESTINAL DISACCHARIDASES. (E.) Lentze, M. (U. Munich Dept. Pediatr., Germany) and K. Harms. *Clin. Chim. Acta* 33(2):301-307, 1971.

Intestinal mucosa from 30 children with malabsorption syndrome was analyzed by thin-layer chromatography for tissue disaccharidases using disaccharide substrates as well as the quantitative hexokinase-glucose-6-phosphate dehydrogenase method. Only 2 of 15 children suffering from nonspecific diarrhea did not show structural abnormalities of the mucosa, and 5 cases could not be measured with the enzyme method as samples were too small. In the other 10 cases the thin-layer chromatography method and the enzyme method revealed lowered lactase activity or no activity at all. A deficient disaccharidase activity caused by gluten-induced enteropathy was found in all cases. The thin-layer chromatographic method, which took less time (one-third) and was more sensitive than the enzyme method, is suitable for the clinical examination of all hereditary and acquired disaccharidase deficiencies and for following the clinical course of gluten-induced enteropathy.

5642 ADVANCES IN THE DIAGNOSIS OF ANAL AND RECTAL ATRESIA BY ULTRASONIC-ECHO EXAMINATION. (E.) Willital, G. H. (U. Erlangen-Nuremberg Dept. Surg., Germany). *J. Pediatr. Surg.* 6(4):454-457, 1971.

An ultrasonic-echo examination for determining the site of the blind-ending rectum in anorectal anomalies has been used successfully in 8 cases. Accurate diagnosis of the site of atresia in anorectal anomalies is important for surgery since in 6-10% of cases of this type the exact location of the colon could not be determined by existing methods. Investigation was indicated in those cases where fistula from the blind-ending rectum could not be demonstrated. The Krautkramer echoencephalograph and the Metrix ultrasonic apparatus were used with the sedated, small patient in the Steinschnitt position. Exact agreement was found between the anal agenesis echo and the level of the rectal atresia later determined at autopsy. X-ray examination of the rectum by two x-ray techniques compared favorably with the ultrasonic findings.

5643 RADIO-IMMUNOASSAY OF CARCINOEMBRYONIC ANTIGEN AS A DIAGNOSTIC TEST FOR CANCER OF THE COLON: A PRELIMINARY REPORT. (E.) Nugent, F. W. (Lahey Clin., Boston, Mass.) and E. R. Hansen. *Lahey Clin. Found. Bull.* 20(3): 85-88, 1971.

Radioimmunoassay for the detection of carcinoembryonic antigen was performed on the serum of 84 patients each of whom had adequate histologic and/or clinical follow-up. Of these, 40 had a present or past history of histologically confirmed cancer of the colon, and this was known in 33 of these when the serum was drawn for assay. Of these 33, the assay was positive in 21, negative in 12. In 7 blood was withdrawn after resection of the colonic cancer (in 1 at 3 days after and in the rest at 2 months to 7 yr after resection) without knowledge of residual disease; the assay was positive in 5, negative in 2. A positive assay was found in all 4 patients with pancreatic cancer. Positive results were also obtained in the single patient with carcinoma of the esophagus, in all of 3 with cancer of the bile ducts, and in the single patient with gastric cancer, while a negative result was obtained in the single patient with duodenal cancer. The assay was negative in patients with adenomatous polyps of the colon (3) and duodenum (1). In nonmalignant patients, positive results were found in 2 with nontropical sprue and 1 each with alcoholic pancreatitis, nonalcoholic pancreatitis, Crohn's disease and nonspecific colitis, while negative results were found in 3 with Crohn's disease and 1 each with diverticulitis, ulcerative proctitis and uremia, granulomatous pericholangitis, active marginal peptic ulcer and active duodenal ulcer.

5644 COLONOFIBEROSCOPY. (E.) Wolff, W. I. (Mt. Sinai Sch. Med., New York, N. Y.) and H. Shinya. *JAMA* 217(11):1509-1512, 1971.

Colonofiberoscopy was performed in 125 patients, most of whom were referred because of definite or suspicious barium enema abnormalities, using 2 types of flexible colonoscope between May and September 1970. Full insertion of the shorter colonoscope (or to a point of obstruction) was achieved in 95% of the patients. Biopsy specimens were always obtainable without difficulty.
The most prominent findings were benign polyp in 43 patients, carcinoma in 24, diverticulosis in 11 and no endoscopic disease in 15. Biopsies were taken below and including the lower sigmoid (within the range of the conventional rigid sigmoidoscope) in 13 patients and above this level up to the ascending colon in 35 patients. Biopsies revealed no false positives and few false negatives. Colonofiberoscopy was more accurate than barium enema in making the diagnosis, occasionally providing information making surgical exploration unnecessary. Pedunculated polyps were successfully removed in some cases via this instrument.

5645 SELECTIVE ARTERIOGRAPHY IN CANCER OF THE PANCREAS AT A RESECTABLE STAGE.

(E.) Suzuki, T. (Kyoto U. Med. Sch., Japan), K. Kawabe, A. Nakayasu, H. Takeda, K. Kobayashi, N. Kubota and I. Honjo. *Am. J. Surg.* 122(3):402-407, 1971.

Seventeen patients with cancer of the pancreas on whom selective upper abdominal arteriography was successfully performed before they underwent resection by pancreatoduodenectomy or distal pancreatectomy are reported. Except for cancer of the ampulla of Vater, arteriography was of value in demonstrating comparatively small lesions of the head and the body of the pancreas. The smallest tumor in which percutaneous selective arteriography confirmed the diagnosis accurately was 3.5 by 3.0 cm in these patients. Further investigation with super-selective arteriography during operation or arteriography of the resected specimen demonstrated pathologic patterns in arteries supplying lesions less than 3 cm in diameter. The radical resection of cancer of the body and tail of the pancreas seemed extremely difficult, even if vascular invasion was confined to the intrapancreatic arteries. Tumor stain was shown by percutaneous arteriography only in cases of cystoadenocarcinoma.

5646 PANCREATIC FUNCTION TESTS: COMPARISON OF STANDARD AND AUGMENTED SECRETIN.

(E.) Hansky, J. (Monash U. Dept. Med., Melbourne, Australia). *Aust. NZ J. Med.* 1(2):109-113, 1971.

Standard and augmented secretin tests were compared for the diagnosis of pancreatic exocrine disease in patients with chronic pancreatitis, carcinoma of the head of the pancreas and calculous obstructive jaundice and cirrhosis. Although all parameters of pancreatic secretion were lower in chronic pancreatitis and carcinoma of the pancreas compared with controls following a standard secretin test (1 U/kg secretin), 7 of 30 patients with chronic pancreatitis had a normal peak bicarbonate concentration and 11 of 30 patients had normal bicarbonate outputs. Following augmented secretin tests (2-3 U/kg) also, all parameters of pancreatic secretion were lower in chronic pancreatitis and pancreatic carcinoma. Of 36 patients with chronic pancreatitis only 4 had normal peak bicarbonate output, giving diagnostic errors of 11 and 5.6%, resp. However, 4 of 6 normal patients had low peak bicarbonate concentration. One of 5 patients with carcinoma of the pancreas had normal parameters of pancreatic secretion in response to the augmented dose, whereas 6 of 7 patients tested with a standard secretin dose had normal pancreatic function. Augmented secretin correctly diagnoses chronic pancreatitis more frequently than a standard test but at the expense of incorrectly indicating chronic pancreatitis when this is not present.

5647 POSITIVE SCINTIPHOTOGRAPHY OF CANCER OF THE LIVER WITH Ga^{67} CITRATE.

(E.) Suzuki, T. (Kyoto U. Med. Sch., Japan), I. Honjo, K. Hamamoto, T. Kousaka and K. Torizuka. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):92-103, 1971.

The clinical usefulness of scintiphotography with ^{67}Ga citrate for the detection of cancer of the liver was evaluated and compared with studies by selective hepatic arteriography in 25 patients with histologically proven liver cancer. Of all 25 cases, 5 showed increased uptake of ^{67}Ga in the tumor (4 hepatomas, 1 cholangioma, 4 metastatic cancers); 6 showed decreased uptake (all metastatic cancers); and 6 were "undetermined" (2 hepatomas, 4 metastatic cancers). In 3 successfully treated metastatic cancers, ^{67}Ga citrate in the lesions showed decreased activity. There was a good correlation between uptake of ^{67}Ga citrate in the tumor and its vascularity observed by arteriography. Liver cancer was visualized in 13 of 25 cases (52%) with the ^{67}Ga citrate scintigraphy alone, while with ^{198}Au colloid alone 17 of 24 cases (70%) were accurately demonstrated. While evaluation with ^{198}Au colloid and ^{67}Ga citrate scintiphotography in combination enabled the correct diagnosis in 18 of 25 cases (72%), 81% (18 of 22) of the lesions could be detected by arteriography alone. In 23 of the 25 cases, (92%), a correct diagnosis could be made using these 3 methods.

5648 α-FETOPROTEIN IN HUMAN HEPATOMA: IMPROVED DETECTION IN SERUM, AND QUANTITATIVE STUDIES USING A NEW SENSITIVE TECHNIQUE.

(E.) Alpert, E. (Massachusetts Gen. Hosp., Boston), R. Hershberg, P. H. Schur and K. J. Isselbacher. *Gastroenterology* 61(2): 137-143, 1971.

α-Fetoprotein was detected in serum by double immunodiffusion in agar gel in 59 of 117 patients (50.5%) with primary hepatocellular carcinoma. Using the counterimmunoelectrophoresis method 71.2% of the 120 patients with hepatocellular malignancy were α-fetoprotein positive. There was a significant ethnic variation in that 51.2% of 41 Caucasian patients with hepatoma from the U.S. were α-fetoprotein positive, whereas 84.3% of the 64 non-Caucasians from the U.S., Uganda and Taiwan were positive. Age and sex apparently had little effect on the incidence of α-fetoprotein appearance. The α-fetoprotein positive tumors, as a group, were significantly larger and less differentiated. Several α-fetoprotein negative patients had unusually long survival times, but the number of survivors was too small at any point to be significant. These differences were not apparent in any individual case. Although the quantitative level of α-fetoprotein varied widely and was of no clinical or prognostic significance, the level tended to generally stabilize with time and may prove valuable in assessing therapy.

5649 SPLENO-PORTOGRAPHY IN THE RAT. (E.) McLachlan, M. S. F. (Welsh Natl. Sch. Med., Cardiff), L. H. Blumgart and E. E. Roberts. *Br. J. Radiol.* 44(524):631-635, 1971.

In 48 male rats, the spleen was moved to a s.c. position by opening the abdomen at the midline making a small muscle split in the left flank and passing the spleen through. This isolated the vascular pedicle of the spleen from the main site of healing. Spleno-portography was then performed by inserting a size 21 needle percutaneously into the pulp of the transposed spleen. Injection of 0.5 ml methylglucamine diatrizoate was used to check proper needle position. No animal showed anastomoses prior to 10 days, the main time of demonstration was 21 days and all rats demonstrated veins. Almost all veins run from the convexity of the spleen and were fairly constant in position. The technique used suggested that venous development may be initiated by previous splenic puncture. Size of the veins was unrelated to frequency of examination.

5650 CHOLANGIOGRAPHIC FINDINGS IN CHOLANGIOLITIC HEPATITIS. (E.) Legge, D. A. (U. Minnesota Mayo Grad. Sch. Med., Rochester), H. C. Carlson, E. R. Dickson and J. Ludwig. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1): 16-20, 1971.

Direct cholangiography was utilized to distinguish patients with cholangiolitic hepatitis from those with extrahepatic obstruction. All cases of cholangiolitic hepatitis at the Mayo Clinic between 1965 and 1969 were reviewed. Direct cholangiography was performed either at operation or by injection of contrast medium into a T-tube in the common bile duct. Direct cholangiograms on 10 cases of cholangiolitic hepatitis showed normal intra- and extrahepatic cholangiograms in 2 cases, and diffuse narrowing of the intrahepatic bile ducts in 8 cases. One normal cholangiogram characterized by filling defects due to inspissated bile was found among the 8 cases with positive roentgenologic findings. Positive cholangiograms indicate advanced hepatic disease but negative cholangiograms do not help rule out cholangiolitic hepatitis. Extrahepatic bile ducts are not involved in cholangiolitic hepatitis and the origin of the lesions causing abnormal intrahepatic cholangiograms is not known. The number of histologically identifiable interlobular ducts decreased both with normal and abnormal cholangiograms. Roentgenographic changes in cholangiolitic hepatitis usually can be distinguished from sclerosing cholangitis and carcinoma of the bile ducts.

5651 ANGIOGRAPHY IN CARCINOMA OF THE BILIARY TRACT. (E.) Reuter, S. R. (U. California Dept. Radiol., San Diego), H. C. Redman and J. J. Bookstein. *Br. J. Radiol.* 44(524):636-641, 1971.

Angiography was found useful in establishing a diagnosis in 20 patients with carcinoma of the biliary tract. Data confirm the impression that cholangioma (hepatic duct carcinoma) can generally be differentiated from hepatoma. The primary angiographic abnormality was serrated arterial encasement with the larger tumors having a moderate number of tumor vessels and some degree of contrast media accumulation while in the smaller tumors these characteristics were not as well defined. Invasion of large veins particularly the portal and hepatic veins is a common feature of hepatoma but not of cholangioma. The finding of an abruptly angulated cystic artery is good evidence of gallbladder carcinoma prior to invasion of the bile duct. Differentiation of cholangioma from poorly vascularized liver metastasis is difficult, although metastases generally tend to displace the hepatic artery branches more than cholangiomas. It was suggested that angiography should be a central part of the radiological evaluation of patients with obstructive jaundice.

5652 STUDIES ON LIVER FUNCTION TEST WITH I^{131} BSP MONOIODIDE AND SCINTICAMERA. (E.) Torizuka, K. (Kyoto U. Sch. Med., Japan), K. Hamamoto, R. Morita, T. Mukai, T. Kousaka, K. Ito, J. Nakagawa and C. Minaguchi. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1): 41-49, 1971.

The usefullness of ^{131}I BSP monoiodide in testing liver and gallbladder function with scinticamera, multichannel pulse height analyzer and digitizing magnetic tape recorder was studied in 10 normal subjects and 42 patients with various liver and gallbladder diseases. Time-lapse serial pictures exposed at 2- and 3-min intervals showed the chronologic changes in the distribution of ^{131}I BSP in the liver, gallbladder and intestine as well as visualization of space-occupying lesions in the liver. Ten minutes after the administration of ^{131}I BSP monoiodide (150 μC i.v.) blood was drawn and the serum percent retention of ^{131}I BSP was estimated from the ^{131}I BSP serum concentration; total serum volume was obtained from the body weight and height. Scintigraphy was performed after 30-60 min. The 30 min percent retention of ^{131}I BSP in serum was 2.4-5.1% in normal patients, 3.0-10.6% in patients with chronic hepatitis, 2.5-8.7% in patients with cholelithiasis, 6.2-11.1% in liver tumor patients, 8.5-32.0% in patients with cirrhosis, and 60% in patients with extrahepatic obstructive jaundice. This procedure appears helpful in liver visualization and determination of liver function.

5653 CHOLECYSTADENOMA AND THE USE OF CHOLECYSTOKININ. (E.) Frenkel, L. D. (New York Hosp., N. Y.), N. B. Javitt and C. K. McSherry. *J. Pediatr.* 79(3):468-470, 1971.

Cholecystokinin was used to stimulate the noncharacteristic pain of gallbladder disease in a 15-yr-old girl. Four injections consisting of 3 injections of isotonic saline and 1 of 25 Ivy dog U of cholecystokinin were used. The cholecystokinin invoked pain that was identical in character and duration to that which prompted admission. A small adenoma was removed surgically. It was concluded that this hormone may be used in the diagnosis of gallbladder disease and in distinguishing a population that will benefit from cholecystectomy.

5654 SERUM α-FETOPROTEIN IN HEPATOMA PATIENTS AFTER LIVER TRANSPLANTATION.

(E.) Alpert, E. (Massachusetts Gen. Hosp., Boston), T. E. Starzl, P. H. Schur and E. J. Isselbacher. *Gastroenterology* 61(2):144-148, 1971.

Changes in the serum α-1-fetoprotein (AFP) levels were determined in 5 patients with hepatoma after autologous liver transplantation to study the value of AFP in predicting tumor recurrence. While AFP levels were unaffected by immunosuppressive therapy, acute or chronic transplant rejection, or intercurrent rejections, they did correlate with tumor growth rate. In 3 patients slow growing residual tumor was indicated by low postoperative AFP levels, whereas in another, elevated serum AFP levels accompanied rapid tumor growth. No AFP could be measured in the other patient who continues to be symptom-free after 9 months. Serum AFP levels are seemingly helpful in determining the presence or absence of residual or recurring tumor following liver transplantation.

5655 THE DETERMINATION OF URINARY 6-OXYGENATED CORTISOL IN EVALUATING LIVER FUNCTION.

(E.) Chamberlain, J. (Searle Sci. Serv., High Wycombe, England). *Clin. Chim. Acta* 34(2):269-271, 1971.

Urinary 6β-hydroxycortisol levels were assayed in 10 normal male subjects and the usefulness of the assay in evaluating liver function in workers exposed to various chemicals was reviewed. The mean excretion of 6β-hydroxycortisol was 255 μg/24 hr. To make the assay applicable to spot urine samples, this was related to the A-ring reduced metabolites in the same urine sample which was found to be 30.7 μg 6-oxysteroid/mg reduced steroid. Workers exposed to endrin showed significantly higher levels of 6-hydroxylation (91.0 μg/mg) than those in a control group (31.3 μg/mg) or those exposed to dieldrin and aldrin (30.3 μg/mg) indicating the usefulness of the assay.

5656 CATHETERIZATION OF THE UMBILICAL VEIN AND ITS USE FOR HEPATOGRAPHY.

(E.) Man, B. (Meir Hosp., Kfar Sava, Israel), L. Kraus and S. Pikielny. *Clin. Radiol.* 22(3):350-360, 1971.

Experiences in 46 umbilical vein catheterizations, which were performed chiefly for hepatography, chemotherapy and for anatomic study, were reported. The collapsed umbilical vein was exposed, dilated and catheterized. In the angiographic phase of roentgen examination, the branches of the portal venous system was demonstrated in detail. In the second hepatographic phase, the contrast medium was demonstrated in the sinusoids, and homogenous liver parenchyma was delineated. Tumors or metastases were clearly visualized in the vascular phase, as distortion and dislocation of the portal branches, and as defects in the homogenous parenchyma in the hepatographic phase. Of 17 cases with liver metastases 16 were detected by hepatography; while among 19 cases with normal livers, one hepatogram was suggestive of metastases. In 10 cases, 5-fluorouracil was infused through the umbilical vein for treatment of metastases or primary liver tumors, resulting in hepatographically-demonstrable liver size reduction, metastases reduction, and peripheral necrosis of metastases.

5657 DETECTION OF AUSTRALIA ANTIGEN IN VARIOUS FRACTIONS OF FROZEN BLOOD.

(E.) Werch, J. (Baylor Coll. Med., Houston, Tex.), R. E. Gray, T. Hersh and J. L. Melnick. *JAMA* 218(1):93-94, 1971.

Seven of 28 Australia antigen positive donor bloods were prepared for freezing by the high glycerol slow-freezing technique. The post-thawing samples were taken for detection of Australia antigen by discontinuous counterimmunoelectrophoresis Australia antigen was recovered from the initial post-thawing wash solution in 5 of 7 units tested. Only 1 of the 7 units of frozen blood had Australia antigen detected in both the saline supernatant of the packed cell unit and in the red blood cell-hemolysate. Thus, in only 1 of 7 samples was the antigen detected in that portion of frozen blood which is given to the recipient. The serum samples of this patient had the highest titers to Australia antigen by complement-fixation. The above may account for the observation that clinical posttransfusion hepatitis has not occurred after administration of frozen blood.

5658 ARYLAMIDASE AND ITS ISOENZYMES IN DISEASES OF THE LIVER AND PANCREAS.

(Ger.) Schlaeger, R. (Univ. Med. Clin., Gottingen, Germany) and R. Kattermann. *Clin. Chim. Acta* 33(1):13-19, 1971.

In preliminary experiments it was established that there is a good correlation between the arylamidase assay using L-leucine-4-nitroanilide as substrate and that using L-alanine-β-naphthylamide as substrate, suggesting that there is no need for replacing the former with the latter. A total of 210 sera from 102 patients with pancreas, liver and other diseases and 40 healthy controls were tested for the presence of arylamidase isoenzyme 2, alkaline phosphatase, α-amylase and L-leucine-4-nitroanilide hydrolase (LAP) activity. Contrary to other reports, isoenzyme 2 was not found to be specific for acute pancreatitis. It was present in only 12 out of 20 patients with acute, none out of 4 with chronic pancreatitis and in 2 out of 5 with pancreatic neoplasms. It was also present in 11 out of 22 patients with liver disease, in 10 out of 11 with cholestasis, 5 out of 5 with liver neoplasms and 15 out of 35 with other diseases. It was not found in any of the control sera. In 23% of sera without isoenzyme 2 the total arylamidase activity was elevated while 22% of sera with isoenzyme 2 showed low arylamidase activity suggesting a low correlation between the two. It is concluded that the presence of arylamidase isoenzyme 2 is more indicative of bile duct obstruction than pancreatitis. Separation of arylamidase into isoenzymes does not seem warranted for diagnosis of pancreatitis.

5659 GRANULOMATOUS HEPATITIS OF OBSCURE AETIOLOGY. DIAGNOSTIC CONTRIBUTION OF KVEIM TESTING AND ANTI-TUBERCULOUS THERAPY. (E.) Fitzgerlad, M. X. (St. Vincent's Hosp., Dublin, Ireland), O. Fitzgerald and R. P. Towers. *Q. J. Med.* 40(159):371-383, 1971.

The value of the Kveim test and therapeutic trials of antituberculous therapy in 5 cases of idiopathic granulomatous hepatitis which posed major diagnostic problems are presented. Two of the patients had positive Kveim tests although neither showed clinical signs consistent with sarcoidosis and the lymph node histology of one of these patients was negative for sarcoid granulomas. The Kveim test may represent abnormal host reactivity which is common to a number of conditions in which cross-reacting antigens occur: sarcoidosis, Crohn's disease, normal subjects failing to convert tuberculin after BCG innoculation, and some idiopathic granulomatous hepatitis. Although tubercle bacilli were not isolated the 3 other patients received antituberculous therapy on the basis of clinical history and, in 2 cases, a good response was obtained. In 1 patient with brucellosis a trial of antituberculous therapy probably masked symptoms.

5660 COMBINED GASTROINTESTINAL AND GALLBLADDER ROENTGENOGRAMS USING FAT ADDED TO BARIUM MEALS. (E.) Bilbrey, R. L. (U. Tennessee Mem. Res. Ctr. Hosp., Knoxville) and E. Buonocore. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):29-33, 1971.

Fat (cooking oil) was added to barium meals in 111 patients in an attempt to achieve contraction of the gallbladder and improve visualization of the gallbladder and biliary collecting system simultaneously with upper gastrointestinal studies. Eleven patients in whom the gallbladder was not visualized were dropped from the study. In none of the 100 remaining patients was the common bile duct seen on routine gallbladder roentgenograms. In 9 patients, the common duct was opacified on the gastrointestinal radiograms. The cystic duct was opacified and visualized in 41 patients after the fat-barium ingestion (versus 3 before). In 10 additional patients the cystic duct was visualized only on delayed roentgenograms. Visualization of the neck of the gallbladder was accomplished in 59 patients (versus 6 with scout roentgenograms). This method seems to be effective in increasing the visualization of biliary structures with simultaneous gastrointestinal studies without adversely affecting the gastrointestinal examination.

5661 INSTILLATION OF ACID INTO THE ESOPHAGUS IN THE DIAGNOSIS OF HEARTBURN IN PREGNANCY. (Sp.) de la Revilla, L., R. Martin-Vivaldi, J. L. Ventin and L. Hernandez. *Rev. Esp. Enferm. Apar. Dig.* 34(6):647-656, 1971.

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IN THE DIAGNOSIS OF LIVER NEOPLASIA. (It.) Mombelli, L. (U. Milan Inst. Nucl. Med., Italy), L. Favaro and U. Meldolesi. *Radiol. Med. (Torino)* 56(10):913-923, 1970.

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See also numbers: 5403, 5553, 5557, 5734, 5781, 5930, 5939, 6036, 6084, 6162

ESOPHAGUS

5720 ESOPHAGEAL STRICTURES AND LOWER ESOPHAGUS LINED WITH COLUMNAR EPITHELIUM. FUNCTIONAL AND MORPHOLOGICAL STUDIES. (E.) Heitmann, P. (Univ. Med. Clin., Marburg/Lahn, Germany), A. Csendes and T. Strauszer. *Am. J. Dig. Dis.* 16(4):307-320, 1971.

Functional and morphological studies were performed on 12 consecutive patients with benign esophageal strictures. A hiatal hernia was detected in each patient with the mean size being 3.5 cm as determined by simultaneous radiographic-manometric studies. The stricture was annular with an extension of 2-8 mm in 4 patients, and it was longitudinal and irregular, extending over 12-40 mm in 8 cases. The lower margin of the stricture was located at a mean distance of 8.3 cm above the physiologically or radiographically determined hiatus. Eight patients showed free reflux of barium into the esophagus, the gastroesophageal sphincter not responding to increases in fundic pressure with an increase in resting pressure. Mean resting end-expiratory pressure in this group was 1.5 mm Hg higher than fundic pressure (range 0-6 mm Hg), significantly lower than normal. On esophagoscopy, there were signs of frank esophagitis in 50% of the cases with gastroesophageal competence and incompetence. Four patients with annular stenosis showed no ulceration while all other strictures were superficially ulcerated. Biopsies showed squamous epithelium above the stricture and columnar epithelium around and below the stricture in all cases. In the region of the stricture, a fundic type of epithelium and a cardial type of epithelium were present with equal frequency. No uniform pattern of gastroesophageal competence, acid secretion nor type of epithelium in the columnar-lined esophagus seems to exist in the Barrett syndrome.

5721 HELLER'S OPERATION FOR ACHALASIA OF THE CARDIA. A STUDY OF THE EARLY AND LATE RESULTS. (E.) Barker, J. R. (Hammersmith Hosp., London) and R. H. Franklin. *Br. J. Surg.* 58(6): 466-468, 1971.

A retrospective study of 30 patients with achalasia of the esophagus treated by Heller's operation revealed that 1 yr after operation 28 patients were completely symptom-free. Five of 14 patients traced 10 yr or more after operation were free from esophageal symptoms and 4 were considerably better although they had mild intermittent attacks of dysphagia. Those with mild symptoms on barium swallow showed marked tertiary contractions perhaps accounting for their occasional retrosternal discomfort on swallowing. Five patients developed reflux esophagitis between 3 and 7 yr postoperatively; 3 of these patients required a second operation. The lack of improvement in the size of the esophagus as determined by radiography did not appear to be related to the symptomatic improvement from the Heller operation, or the subsequent development of reflux esophagitis.

5722 INTRAEPITHELIAL CARCINOMA ASSOCIATED WITH ESOPHAGEAL CARCINOMA. (E.) Akiyama, H. (U. Tokyo Fac. Med.), K. Ushiyama and T. Kogure. *J. Abdom. Surg.* 13(8):178-187, 1971.

The relationship of intraepithelial carcinoma with esophageal carcinoma was studied in 115 patients who had primary esophageal cancer treated by resection between 1952 and 1969 in Tokyo. These disorders were seen together in 26 (22.6%) of 115 cases. Intraepithelial carcinoma was seen in only 9.8% of cases that were irradiated; whereas it coexisted with esophageal carcinoma in 29.7% of nonirradiated cases. The age distribution of intraepithelial carcinoma was very similar to the age distribution of esophageal cancer. Intraepithelial carcinoma was continuous with the main lesion in 10 cases and showed an island-like distribution in 16, suggesting the predominance of the stepping stone-like lesion. The direction of long axis extension appeared more frequently towards the proximal side, the average distance of extension being 1.5 cm towards the proximal and distal sides. This corresponded to about 4.5 cm of the actual physiological length, and should be kept in mind during resection. The lesions were classified histologically into 3 types: basal layer, mixed, and full thickness type, according to which layer was mainly affected. The full thickness type was the most common (13 of 26) and the frequency of mitosis was highest in this type. In the layer next deeper to the basal cells, the lamina propria, frequent round cell infiltration was seen.

5723 GASTRIC-TYPE EPITHELIUM IN THE UPPER ESOPHAGEAL POUCH IN CHILDREN WITH TRACHEOESOPHAGEAL FISTULA. (E.) Emery, J. L. (Child. Hosp., Sheffield, England) and A. J. Haddadin. *J. Pediatr. Surg.* 6(4):449-453, 1971.

Necropsies of 35 children with esophogeal atresia and tracheoesophageal fistula were compared to 400 sections of control necropsy material. Foci of gastric type epithelium in the upper esophageal pouch was noted in 34% of the children with atresia as compared with 2.5% of the controls. The presence of the gastric epithelium seems to point to a abnormal septation of the foregut in the 8-17 mm embryonic stage. Caudal displacement of the separating trachael bud would explain the formation of the fistula deformity. The high incidence of gastric epithelium in the pouch of the children with fistula plus its occurrence in a few normals indicates variable development. That this epithelium represents an acquired condition precipitated by regurgitation, infection, etc. is rejected. Eighteen of the children with this anomaly died within 4 days of birth. The presence of this epithelium predisposed to spasms and ulceration at the site.

5724 ADENOCARCINOMA IN BARRETT'S COLUMNAR-LINED ESOPHAGUS. (E.) Shafer, R. B. (VA Hosp., Minneapolis, Minn.). *Arch. Surg.* 103(3):411-413, 1971.

A 62-yr-old man presented with a vague history of occasional postprandial retrosternal burning. However, evaluation of a filling defect in the distal esophagus on an upper gastrointestinal tract series led to esophagoscopy and biopsy. Esophagoscopy showed esophagitis and an 8 mm lesion in the distal esophagus. On direct observation this lesion appeared benign. Multiple biopsies of the lesion were taken and proved to contain adenocarcinoma in the gastric mucosa. At exploratory laparotomy, an intraluminal lesion located 5 cm above the esophagogastric junction was excised. There was columnar epithelium lining the lower portion of esophagus (Barrett's syndrome), within which there was adenocarcinoma forming abnormal glands. The finding of Barrett's syndrome should alert the clinician to the possibility of asymptomatic esophagitis with stricture formation, ulceration, fistula or the possibility of malignancy.

5725 SPONTANEOUS PERFORATION OF THE ESOPHAGUS. (E.) Wilson, R. F. (Wayne State U. Sch. Med., Detroit, Mich.), E. J. Sarver, A. Arbulu and R. Sukhnandan. *Ann. Thorac. Surg.* 12(3):291-296, 1971.

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5732 STRANGULATING DIAPHRAGMATIC HERNIA. (E.) Carter, R. (704 N. Neil St., West Covina, Calif.) and L. A. Brewer, III. *Ann. Thorac. Surg.* 12(3):281-290, 1970.

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5734 DIAGNOSTIC DIFFICULTIES IN INCARCERATED CONGENITAL DIAPHRAGMATIC HERNIA IN CHILDREN. (Pol.) Bech, R. (Reg. Hosp. Intern Dis., Slupsk, Poland) and W. Zielinski. *Pediatr. Pol.* 46(2):211-215, 1971.

5735 A CASE OF PERFORATION OF THE ESOPHAGUS DURING ATTEMPTED TRACHEAL INTUBATION. (Fr.) Weill, E. (Nevers Hosp. Ctr., Nievre, France). *Chirurgie* 97(1):74-76, 1971.

5736 ENDOSCOPY IN PERFORATING INJURIES OF THE ESOPHAGUS. (Cz.) Tichy, S. (Charles U. Med. Sch., Prague). *Cesk. Gastroenterol. Vyz.* 25(2):59-61, 1971.

5737 PERSONAL TACTICS IN ESOPHAGEAL EXTRACTIONS OF FOREIGN BODIES FROM THE ESOPHAGUS. (Cz.) Skerik, P. (Thomayerovy Hosp., Prague). *Cesk. Gastroenterol. Vyz.* 25(2):61-63, 1971.

5738 LARGE DIAPHRAGMATIC HERNIAS IN THE NEWBORN. (Ger.) Joppich, I. (Univ. Pediatr. Clin., Munich, Germany). *Fortschr. Med.* 89(12):523-525, 1971.

5739 ASPECTS OF THE THERAPY OF ESOPHAGEAL VARICES IN INFANTS. (Ger.) Sauer, H. (Univ. Surg. Clin., Innsbruck, Austria) and J. Glatzl. *Paediatr. Paedol.* 6(1):94-101, 1971.

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5741 DIAGNOSIS AND TREATMENT OF STRANGULATED DIAPHRAGMATIC HERNIAS. (Rus.) Biber. O. I. *Khirurgiia (Mosk.)* 47(3):113-117, 1971.

5742 ALTERATION OF THE CONTENT OF NUCLEIC ACIDS IN THE BLOOD OF PATIENTS WITH CANCER OF THE ESOPHAGUS AND STOMACH DURING RADIATION TREATMENT USING A 25 MEGAVOLT BETATRON. (Rus.) Fridliand, I. B., M. B. Ginzburg and I. I. Kornev. *Med. Radiol. (Mosk.)* 16(1):22-28, 1971.

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5747 EXPERIMENTAL STUDIES ON MYOPLASTY OF THE ESOPHAGUS AND CARDIA USING A FOLD OF GASTRIC FUNDUS AFTER CARDIAC SURGERY BY THE METHOD OF HELLER-JEZIORO. (Pol.) Misterka, S. (Med. Acad. 3rd Surg. Clin., Wroclaw, Poland). *Pol. Przegl. Chir.* 43(1):15-19, 1971.

5748 DIAGNOSTIC AND THERAPEUTIC PROBLEMS OF UPPER DIGESTIVE HEMORRHAGES (SDH) IN THE AGED. (Rum.) Csiky, N. (1st Surg. Clin., Tirgu Mures, Rumania). *Rev. Med. (Tirgu Mures)* 16(3-4):312-315, 1970.

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5750 LEIOMYOSARCOMA OF THE ESOPHAGUS. (Fr.) Etienne, J. P. (Broussais Hosp., Paris), P. Delavierre, J. P. Petite and H. Durand. *Sem. Hop. Paris* 47(18):1170-1172, 1971.

5751 SURGICAL TREATMENT OF PEPTIC ESOPHAGITIS AFTER GASTRECTOMIES AND PROXIMAL RESECTIONS OF THE STOMACH. (Rus.) Samokhvalov, V. I. *Vestn. Khir.* 106(2):21-24, 1971.

5752 SOME PROBLEMS OF THE SURGICAL TREATMENT OF CICATRICIAL NARROWING OF THE ESOPHAGUS IN CHILDREN. (Rus.) Isakov, J. F., E. A. Stepanov and G. A. Gadzhimirzaev. *Vestn. Khir.* 106(2):69-73, 1971.

5753 THERMAL SPRING TREATMENT OF HIATAL HERNIAS. (Fr.) Debray, C. (Bichat Hosp., Paris), J. De La Tour, M. Solere and J. Chariot. *Therapeutique* 47(2):119-122, 1971.

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5756 RADIOLOGIC FINDINGS IN POLYMYOSITIS - DETERMATOMYOSITIS INVOLVING THE PHARYNX AND UPPER OESOPHAGUS. (E.) Grunebaum, M. (Tel Aviv Univ. Med. Sch., Petah Tiqva, Israel) and H. Salinger. *Clin. Radiol.* 22(1): 97-100, 1971.

5757 FUNCTION OF THE CARDIA IN CHILDREN. MANOMETRIC, CINERADIOGRAPHIC AND PHARMACORADIOGRAPHIC STUDIES. (Ger.) Willich, E. (Univ. Pediatr. Clin., Heidelberg, Germany). *Fortschr. Med.* 89(9):389-392, 1971.

5758 CONGENITAL ACHALASIA OF THE ESOPHAGUS IN FOUR CATS OF COMMON ANCESTRY. (E.) Clifford, D. H. (VA Hosp., Houston, Tex.), F. K. Soifer and C. F. Wilson. *J. Am. Vet. Med. Assoc.* 158(9):1554-1560, 1971.

5759 THE HIATAL HERNIAS OF MORGAGNI. CONSIDERATIONS ON FIVE CASES. (Sp.) Paris, F. (La Fe City Sanitar., Valencia, Spain), V. Tarazona and E. Blasco. *Hosp. Gen. (Madr.)* 10(6):695-704, 1970.

5760 USE OF ABDOMINAL WALL MUSCLE FLAP IN REPAIR OF LARGE CONGENITAL DIAPHRAGMATIC HERNIA. (E.) Simpson, J. S. (Hosp. Sick Child., Toronto, Ontario, Canada) and J. D. Gossage. *J. Pediatr. Surg.* 6(1):42-44, 1971.

5761 ATRESIA OF THE ESOPHAGUS. A SYNOPSIS OF 20 CASES. (Fr.) Desorgher, G., M. Bayart, B. Vinchon and G. Dieval. *J. Sci. Med. Lille* 89(3):111-114, 1971.

5762 PRIMARY OESOPHAGEAL VARICES. CASE REPORTS WITH A REVIEW OF THE LITERATURE. (E.) Tonelli, S. (Univ. 1st Dept. Pathol., Rome) and G. Campanelli. *R. C. Rom. Gastroenterol.* 3(1):14-22, 1971.

See also numbers: 5489, 5633, 5634, 5661, 5662, 5663, 5935

5763 LONG-TERM FOLLOW-UP OF SUBJECTS WITH SUPERFICIAL GASTRITIS OR A NORMAL GASTRIC MUCOSA. (E.) Siurala, M. (Helsinski U. Cent. Hosp.) and H. J. Salmi. *Scand. J. Gastroenterol.* 6(5):459-463, 1971.

The results of follow-up studies performed on 168 patients with normal gastric mucosa and 93 with superficial gastritis for periods ranging from 16-20 yr are reported. Nine subjects with atrophic gastritis had during an earlier follow-up period developed gastric carcinoma and 2 gastric polyps. In 7 subjects with superficial gastritis, the body mucosa was found to be normal upon reexamination. In most cases, however, gastritis seemed to remain unchanged or had progressed. Of the 44 subjects with superficial gastritis who were seen more than once, 35 had abdominal stress after 16-20 yr and 4 had duodenal and 1 had gastric ulcer. The serum vitamin B_{12} level was normal in all but one of the subjects reexamined in 1970. In a number of subjects with originally normal body mucosa, the mucosa remained normal in spite of advanced age and a long period of observation.

5764 SYNTROPY OF PULMONARY TUBERCULOSIS AND GASTRIC RESECTION. (Ger.) Kühn, R. A. (Univ. Med. Clin., Jena, Germany), D. Kob and B. Meisl. *Z. Gesamte Inn. Med.* 26(8):265-268, 1971.

Among 7,275 patients with pulmonary tuberculosis there were 195 patients who also had gastric resection indicating a statistically significant association between the 2 conditions among males. In 85.7% of cases gastric resection preceded tuberculosis by several years (average 9 yr) suggesting that tuberculosis was a secondary disease induced by the surgical procedure. Longer (average 20%) therapy was required by these patients and the incidence of relapse (50%) was significantly higher than in nonresected patients. Blood level determinations of p.o. administered isonicotinic acid hydrazide and cycloserine revealed that both drugs were absorbed as efficiently in patients with gastric resection as in those without. It was concluded that the predisposition to tuberculosis in patients with gastric resection is due to protein deficiency caused by insufficiency of absorption and impaired proteolysis which ultimately leads to immunoglobulin deficiency and lowered resistance. Preventive measures such as protein-rich diets and/or enzyme substitution are therefore mandatory in patients with gastric resection.

5765 CONGENITAL HYPERTROPHIC PYLORIC STENOSIS IN PHENOTYPIC FEMALE TWINS WITH X/XX MOSAICISM. (E.) Ven der Horst, R. (U. Natal Dept. Pediatr., South Africa), J. Frankel and J. Grace. *Arch. Dis. Child.* 46(248):554-556, 1971.

Two 5-month-old monozygotic female twins with congenital hypertrophic pyloric stenosis are presented. Cytological findings showed a normal female (46 XX) karyotype. The twin girls were phenotypically females, appeared to be normal and both showed 45 X/46 XX mosaicism upon chromosomal analysis. No history of pyloric stenosis was obtained from the parents or near relatives. The incidence of pyloric stenosis in 2 twin females with X/XX mosaicism substantiates the hypothesis of an hereditary factor in the etiology of congenital hypertrophic pyloric stenosis.

5766 CONGENITAL MICROGASTRIA ASSOCIATED WITH SKELETAL MALFORMATIONS: A NEW SYNDROME. (Ger.) Schulz, R. D. (Univ. Pediatr. Clin., Dusseldorf, Germany) and F. Niemann. *Helv. Paediatr. Acta* 26(2):185-191, 1971.

A 4-day-old premature infant with oligodactylia, dolichocephaly, and hypoplasia of the right ulna and radius developed ileus of the small intestine caused by intestinal malrotation (Type I). Radiological examination of the patient made after surgical correction of intestinal malrotation showed aplasia of the stomach and duodenal bulb, a sliding hiatus hernia, and gastroesophageal reflux. Despite frequent feeding through a tube, caloric intake was inadequate and the child died of marasmus when she was 1.5-yr-old. No chromosome anomalies were found. This association of congenital anomalies has not been previously described and is probably a new syndrome belonging to the group of oligodactylia syndromes.

5767 SIGNIFICANCE OF PYLOROMYOTOMY AND PYLOROPLASTY. (E.) Maki, T. (Tohoku U. Sch. Med., Sendai, Japan), T. Shiratori, K. Nagaoka and T. Okabayashi. *Tohoku J. Exp. Med.* 104(1):45-54, 1971.

The significance of pyloromyotomy and pyloroplasty as drainage procedures was studied in dogs. While pyloromyotomy was effective in suppressing abnormal excitation of the pylorus, thus reducing the pyloric contraction pressure, pyloroplasty was more effective as a drainage procedure. Pyloromyotomy served to decrease the contractile force of the circular smooth muscle while preserving sphincter function. Pyloroplasty, on the other hand, widened the lumen for greater drainage while sacrificing the sphincteric function of the pylorus. Thus, pyloroplasty seems to be indicated when more effective drainage is expected in the markedly excited pyloric portion even at the sacrifice of sphincteric function, while pyloromyotomy is indicated when preservation of the sphincteric action is desired and not too powerful drainage effect is expected in a marked excitation of the pylorus.

5768 EFFECT OF DEFICIENCY OF GASTRIC MUCUS ON POSTHISTAMINIC SECRETION AND GASTRIC MUCOSA OF HEIDENHAIN POUCH. (E.) Kowalewski, K. (U. Alberta Surg.-Med. Res. Inst., Edmonton, Canada) and J. F. Schier. *Acta Gastroenterol. Belg.* 34(4-5):361-367, 1971.

The effect of deficiency of gastric mucus on the posthistamine secretion and gastric mucosa of Heidenhain pouches was studied by treating dogs with gastric lavage with a hypertonic saline solution (2M NaCl) for 2 hr and then stimulating with an intra-arterial infusion of histamine for 6 hr. In pouches depleted of mucus, more fluid and pepsin was secreted, but the concentration of HCl was lower than in control pouches. All pouches treated with HCl before histamine stimulation showed macroscopic signs of acute hemorrhagic gastritis including edema, marked congestion, superficial, submucosal and subserosal hemorrhagic spots, mucosal erosions and "acute ulcers". Microscopically the lesions resembled acute posthistaminic gastric ulcers previously reported in dogs and guinea pigs. There was no detectable abnormality in the structure and cellular composition of gastric glands. Pouches washed with normal saline before histamine stimulation appeared normal both macroscopically and histologically.

5769 MORPHOLOGY AND PROGNOSIS OF CARCINOMA OF THE STOMACH. (E.) Paile, A. (U. Helsinki 2nd Dept. Pathol.). *Ann. Chir. Gynaecol. Fenn.* 60(Suppl. 175):1-56, 1971.

Gastric carcinoma specimens from 152 patients undergoing resection between 1953-1962 were classified histologically as to ability to form glands (adenoid; islet or intermediate; diffuse) but revealed no differences as to prognosis. Conversely, degree of carcinoma invasion had considerable prognostic effects as did carcinoma mucus secretion (mucus levels negatively correlated with prognosis). Infiltration of stromal round cells (thought to indicate organism resistance) was directly proportional to prognosis and inversely proportional to tumor necrosis. Cancer invasion affected prognosis twice as much as mucus secretion and round cell infiltration. The degree of Unna-Pappenheim-positive cells of the immunologic series had no effect on prognosis, indicating that cells producing circulating antibodies play no role in cancer resistance. Stromal fibrosis in the primary tumor and lymph node metastases was not correlated with prognosis. A relatively good prognosis was seen in patients in which cancer cells were poor in cytoplasm, lacked mitotic figures, contained fibrotic stroma and had enlarged nucleoli. Cancer cell polymorphism had no influence on prognosis.

5770 A NEW TECHNIQUE FOR GASTROTOMY. (E.) Waugh, D. E. (Martin Army Hosp., Fort Benning, Ga.). *Surgery* 70(3):368-369, 1971.

Automatic stapling devices (pediatric or standard gastrointestinal anastomosis instruments) now enable surgeons to perform bloodless gastrotomy in approximately 1 to 2 min. Gastrotomy done by utilizing this instrument can be closed in the usual manner. If the gastrotomy has been performed through the pylorus it is possible to convert the opening to a pyloroplasty by closing transversely. This procedure thus far has presented no untoward effects.

5771 UNUSUAL TYPE OF HYPOCHROMIC ANEMIA COMPLICATING BILLROTH II TYPE GASTRECTOMY. (E.) Haurani, F. I. (1015 Sansom St., Philadelphia, Pa.) and C. W. Wirts. *Am. J. Dig. Dis.* 16(4):343-348, 1971.

A patient who had severe hypoferremic hypochromic anemia 13 yr after Billroth II subtotal gastrectomy, and did not respond to p.o. or i.m. iron therapy is presented. Iron absorption studies revealed a low value in the presence of normal red cell utilization of iron. Steatorrhea was mild (about 14 g/day), while the bacterial content in the afferent loop was high. Although chloramphenicol eliminated the Escherichia coli from the afferent loop, the patient failed to respond in terms of decreased fecal fat excretion to normal, or in improvement of serum iron level or hemoglobin concentration. Ferrokinetic studies revealed a low iron level (10%) indicating defective iron utilization. Conversion of the Billroth II gastrojejunostomy to a Henley jejunal interposition was followed by an increase in iron absorption from 1.1 to 27.5%, but the serum iron remained low.

5772 CROSSCUT GASTROJEJUNOSTOMY. (E.) Hoerr, S. O. (Cleveland Clin., Ohio) and R. B. Turnbull. *Surg. Gynecol. Obstet.* 133(3):485-488, 1971.

The records of 93 patients who survived a crosscut gastrojejunostomy (tranverse rather than longitudinal incision in the jejunum) were reviewed to determine the incidence of postoperative gastric retention. While only 2 patients demonstrated severe gastric retention, 5 others showed transient stomal malfunction that did not increase their hospital stay appreciably. In one patient who underwent a palliative exclusion procedure for advanced carcinoma of the distal part of the stomach, the anastomosis never functioned properly up to the time of death several weeks after surgery. The observed incidence of postoperative gastric retention compared favorably with that after conventional gastrojejunostomy.

5773 PROSPECTIVE STUDY OF GASTRIC SECRETION IN STRESSED PATIENTS WITH INTRACRANIAL INJURY. (E.) Idjadi, F., R. Robbins, W. M. Stahl (New York U. Med. Ctr., N. Y.) and G. Essiet. *J. Trauma* 11(8):681-688, 1971.

Measurements were made of gastric acid, pepsin, and various mucopolysaccharides in 7 severely stressed patients who had isolated intracranial injury. Total acidity and total titratable acidity were significantly elevated, the greatest elevation being observed in 2 patients who bled from stress ulceration. Pepsin concentration was also elevated considerably in the patient group as a whole, but especially in the 2 bleeding patients. The levels of hexose and hexosamine were generally lower among the patients, and values for fucose were higher in the maximally stressed patients, and minimally elevated in the bleeders. Levels of sialic acid were essentially unchanged. Gastric mucosal ulceration following stress from intracranial injury may be due to hypersecretion of acid and pepsin and a decrease in the production of normal mucus.

5774 PATHOGENESIS OF THE MALLORY-WEISS SYNDROME. (Ger.) Mittermayer, C. (U. Freiburg Pathol. Inst., Germany), H. Thiele, G. Spillner and P. Ostendorf. *Beitr. Pathol. Anat.* 114(4):44-62, 1971.

Mallory-Weiss syndrome was diagnosed in only 5 autopsied patients (3 men and 2 women, aged 23-90 yr) out of 2010. Of these 5 patients, only 2 had severe vomiting (caused by uremia and an esophageal carcinoma, resp.) before death and only 1 patient had a history of alcoholism. Histological examination of the stomachs revealed that in 4 cases many microthrombi were present in the stomach wall, resulting in localized necrosis and probably in mucosal lacerations. Thrombocytopenia and blood clotting disorders causally related to septicemic shock were present in 2 patients. In a man with an esophageal carcinoma, Mallory-Weiss syndrome was partially attributed to the indirect effect of radiation (total of 6000 r). Chronic erosive gastritis was present in another patient who had been given large doses of cortisone over a long period for aplastic anemia. The diagnosis of Mallory-Weiss syndrome was not established before death in any of these 5 patients.

5775 RESULTS OF SURGERY IN STOMACH CANCER: PERSONAL EXPERIENCE. (Ger.) Maurer, W. (Forchheim City Hosp., Germany) and V. D. Buchholz. *Z. Gastroenterol.* 9(4):246-255, 1970.

5776 RADIOLOGICAL SIGNS AND INCIDENCE OF THE GASTRIC MANIFESTATION OF MALIGNANT LYMPHOMA. (Ger.) Hilweg, D. (Univ. Radiol. Clin., Hamburg-Eppendorf, Germany) and D. Novak. *Z. Gastroenterol.* 9(4):277-284, 1971.

5777 TREATMENT OF GASTRIC DYSPEPSIA WITH THE ANTIHISTAMINE MEDRIN - COMPARISON WITH METOCLOPRAMIDE (PRIMPERAN) THERAPY. (Sl.) Jaroš, F., R. Kratnová and E. Gočár. *Cesk. Gastroenterol. Vyz.* 25(5):204-208, 1971.

5778 REMOVAL OF THE UPPER POLE OF THE STOMACH FOR TREATING MALIGNANT TUMORS OF THE ESOPHAGUS, CARDIA, AND GREATER CURVATURE. (Sp.) Aguirre, C. (Natl. U. Cordoba 2nd Dept. Clin. Surg., Argentina), M. Halabi and A. A. Diaz. *GEN (Caracas)* 25(3):213-223, 1971.

5779 HYPERTROPHIC GASTROPATHY WITH HYPERSECRETION AND GASTRIC PROTEIN LOSS. (E.) Roberts, H. J. V. (Royal Brisbane Hosp., Brisbane, Australia). *Aust. NZ J. Med.* 1(1): 69-71, 1971.

5780 CONGENITAL MICROGASTRIA. (Fr.) Schulz, R. D. (Univ. Pediatr. Clin., Dusseldorf, Germany). *Ann. Radiol.* 14(3-4):285-287, 1971.

5781 PHYTOBEZOAR OF THE STOMACH COMPLICATING GASTRO-ENTEROSTOMY. REPORT OF A CASE. (E.) Isbister, W. H. (Cleveland Clin. Found., Ohio). *Br. J. Surg.* 58(7):550-553, 1971.

5782 GASTROSCOPY IN GASTRIC HAEMORRHAGE. (Cz.) Maratka, Z. (Na Bulovce Hosp., Prague), J. Nedbal and M. Paleckova. *Cesk. Gastroenterol. Vyz.* 25(2):63, 1971.

5783 SUCTION BIOPSY OF GASTRIC MUCOSA IN CASES OF GASTRITIS COMPLICATED BY PEPTIC ULCER, CARCINOMA AND POLYP OF THE STOMACH. (Jap.) Suzuki, T. (Gifu U. Sch. Med., Japan). *Acta Sch. Med. Univ. Gifu* 18(2):121-154, 1970.

5784 CLINICAL ANALYSIS AND NEW HISTOPATHOLOGICAL FINDINGS ON EROSIVE GASTRITIS OBSERVED IN THE RESECTED STOMACH WITH BENIGN ULCER. (Jap.) Furuya, K. (Keio U. Sch. Med., Tokyo). *Nippon Shokakibyo Gakkai Zasshi (Jap. J. Gastroenterol.)* 67(12):1115-1126, 1970.

5785 ACUTE NECROSIS OF THE STOMACH FOLLOWING INGESTION OF HYDROCHLORIC ACID. (Sp.) Manana, J., E. Zito and W. Liard. *Cir. Uruguay* 40(3):251-255, 1970.

5786 COMPLICATIONS OF GASTRIC HETEROTOPIC PANCREAS: TWO CASE REPORTS. (E.) McGarity, W. C. (Emory U. Sch. Med., Atlanta, Ga.) and C. W. Perry. *Am. Surg.* 37(2):77-79, 1971.

5787 TUBE GASTROSTOMY IN MAJOR ABDOMINAL SURGERY OF THE AGED, AND A MODIFIED GASTROSTOMY TUBE. (E.) Torrado, R. A. (St. Francis Hosp., Miami Beach, Fla.). *J. Abdom. Surg.* 13(4):82-83, 1971.

5788 A RARE CASE OF GASTRIC PHYTOBEZOAR. (Bul.) Markov, D. *Khirurgiia (Sofiia)* 24(1):98-100, 1971.

5789 PSEUDOCYSTIC NEURINOMA OF THE STOMACH. (Bul.) Sedloev, S. and R. Takov. *Khirurgiia (Sofiia)* 24(1):114-117, 1971.

5790 GASTRIC POLYPOSIS WITH THE CONTRIBUTION OF TWO CASES. (Bul.) Kircev, I., D. Tagarov and T. Karavasilev. *Khirurgiia (Sofiia)* 24(1):87-89, 1971.

5791 FURTHER CONSIDERATIONS ON SEVERE DIARRHEA FOLLOWING VAGOTOMY. (Bul.) Hadziev, D. and Z. Bahariev. *Khirurgiia (Sofiia)* 24(1):74-75, 1971.

5792 THE PATIENT AFTER OPERATIONS ON THE STOMACH. (Ger.) Muller Wieland, K. (U. Hamburg 1st Med. Clin., Germany). *Med. Welt* 22(10):357-361, 1971.

5793 ETIOLOGIC IMPORTANCE OF LAMBLIA IN CHRONIC GASTRITIS. (Rus.) Ishchuk, A. G. *Med. Parazitol. (Mosk.)* 40(1):67-71, 1971.

5794 OSTEOMALACIA FOLLOWING VAGOTOMY AND PYLOROPLASTY. (E.) Mitchell, A. B. S. (West London Hosp.), D. Glass and A. M. Gill. *Postgrad. Med. J.* 47(546):233-237, 1971.

5795 HISTOENZYMATIC ASPECTS OF BENIGN AND MALIGNANT EPITHELIAL TUMORS OF THE STOMACH. (Rum.) Dragoncea, C. (Grivita Hosp., Bucharest, Rumania), G. Aposteanu and T. Sparchez. *Morfol. Norm. Patol.* 16(1):21-29, 1971.

5796 METABOLIC CHANGES IN THE GASTRECTOMIZED PATIENT. THE AGASTRIA SYNDROME. (Sp.) Balibrea Cantero, J. L. (Univ. Sch. Med., Madrid). *Rev. Clin. Esp.* 120(1):1-10, 1971.

5797 POSTPRANDIAL SYNDROME FOLLOWING GASTRECTOMY. (It.) Camarri, E. (Civil Hosp., Grosseto, Italy) and L. Zaccherotti. *Riv. Osp.* 3(2):113-128, 1971.

5798 MALIGNANT VILLOUS TUMORS OF THE STOMACH. (Fr.) Delavierre, P. (Vaugirard Hosp., Paris), M. Arsac, J. Hureau and P. Vayre. *Sem. Hop. Paris* 47(18):1177-1182, 1971.

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5801 THE ORIGIN OF PROTRUDING TYPES OF EARLY GASTRIC CANCER. POLYPOGENIC CANCER AND POLYPOID CANCER. (Jap.) Muto, T. (U. Tokyo Sch. Med.) and K. Doci. *Stomach Intest. (Tokyo)* 6(1):9-18, 1971.

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5803 CONGENITAL PYLORIC ATRESIA: A REPORT OF THREE CASES AND A REVIEW OF THE LITERATURE. (E.) Bronsther, B. (Booth Mem. Hosp., New York, N. Y.), M. R. Nadeau and M. W. Abrams. *Surgery* 69(1):130-136, 1971.

5804 PERFORATED CASES OF GASTRIC CANCER. (Jap.) Nishi, M. (Cancer Inst. Hosp., Tokyo), T. Kanno and F. Kasumi. *Stomach Intest. (Tokyo)* 6(4):437-443, 1971.

5805 CARCINOMA OF THE GASTRIC STUMP. A LATE COMPLICATION AFTER ULCER RESECTION. (Ger.) Howanietz, L. (Univ. 2nd Surg. Clin., Vienna) and G. Wense. *Zentralbl. Chir.* 96(13): 437-439, 1971.

5806 GASTRIC RETICULOSARCOMA. (Rus.) Gerasimenko, V. N., E. O. Kovalevskii and A. A. Klimenkov. *Klin. Med. (Mosk.)* 49(3): 41-43, 1971.

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5809 HAEMATOLOGIC CHANGES IN A CASE OF GASTRIC CANCER. (Pol.) Przybylowski, J. (Med. Acad. Clin. Intern. Occup. Dis., Zabrze, Poland), G. Kuleszynska and A. Bober. *Pol. Tyg. Lek.* 26(16):602-603, 1971.

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5811 A LESION OF CHRONIC GASTRIC EROSION RESEMBLING IIa + IIc EARLY CARCINOMA. (Jap.) Strauszer, T. (J. J. Aguirre Hosp., Santiago, Chile), P. Castillo and A. Csendes. *Stomach Intest. (Tokyo)* 6(4):481-484, 1971.

5812 A CASE OF GASTRIC LIPOMA. (Jap.) Toma, H. (Toma Hosp., Kumagaya, Japan), M. Arai and K. Ro. *Stomach Intest. (Tokyo)* 6(4):467-472, 1971.

5813 A CASE OF ATYPICAL EPITHELIUM AND LOW IIa + IIc INDEPENDENT FROM EACH OTHER AND YET SEEN BOTH ON THE ANTERIOR WALL. (Jap.) Aoyama, D. (Osaka Kaisei Hosp., Japan), A. Ogino and J. Ohara. *Stomach Intest. (Tokyo)* 6(4): 461-465, 1971.

5814 A CASE OF EARLY GASTRIC CANCER (III + IIc) ASSOCIATED WITH LINEAR ULCER. (Jap.) Nagase, T. (Funabashi Cent. Hosp., Japan) and H. Ohkubo. *Stomach Intest. (Tokyo)* 6(4): 455-459, 1971.

5815 A CASE OF IIc + IIa TYPE OF MINUTE EARLY GASTRIC CANCER ORIGINATING FROM EROSIONS IN THE BOUNDARY LINE AREA. (Jap.) Akasaka, Y. (Kyoto Prefect. U. Med., Japan), A. Kobayashi, H. Uematsu and K. I. K. Kawai. *Stomach Intest. (Tokyo)* 6(3):355-360, 1971.

5816 CONGENITAL ATRESIA OF THE PYLORUS. (Ger.) Mittelstaedt, W. (City Hosp., Osnabruck, Germany). *Zentralbl. Chir.* 96(4): 145-149, 1971.

5817 GASTROSCOPIC STUDIES ON GASTRITIS, EROSION AND ULCER. (E.) Ottenjann, R. (German Clin. Diagn., Wiesbaden), W. Rösch and K. Elster. *R. C. Rom. Gastroenterol.* 3(1):38-46, 1971.

See also numbers: 5434, 5435, 5501, 5503, 5506, 5507, 5634, 5635, 5662, 5663, 5664, 5665, 5666, 5667, 5668, 5669, 5670, 5671, 5672, 5673, 5674, 5675, 5676, 5677, 5678, 5679, 6075

PEPTIC ULCERS

5818 PEPTIC ULCER OF THE PYLORIC REGION. (E.) Glickman, M. G. (U. California Sch. Med., San Francisco), G. Szemes, P. Loeb and A. R. Margulis. *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 113(1):147-158, 1971.

The roentgenographic, clinical, and laboratory findings were correlated in 40 patients with ulcers involving the pylorus. Sixty-five percent (26 patients) presented with the characteristic syndrome of atypical pain, nausea and vomiting, and weight loss (pyloric channel syndrome). Classic signs and symptoms of peptic ulcer were present in the remaining 14 patients. Of 7 small ulcers which were totally within the pylorus, all healed when treated medically, but 1 required surgery 6 months later because of recurrence. Of the remaining 11 small ulcers, the 4 on the duodenal side of the pylorus healed without surgery, and 5 of the 7 ulcers on the gastric side responded well to medical therapy. The caliber of the pylorus after healing was normal or widened in 14 patients and narrow in 4. Of the 11 large ulcers (>1 cm in diameter) on the gastric side of the pylorus, 8 healed without surgery and 2 others were malignant tumors. All 6 larger ulcers on the duodenal side healed with medical therapy. Of the 40 ulcers studied, 33 (83%) were healed by medical therapy, 5 patients had surgery, 1 had radiation therapy and 1 refused surgery. Gastric secretions were lowered in 16 of 22 patients studied. All ulcers involving the pylorus may best be considered pyloric ulcers regardless of extent, considering the lack of difference in clinical presentation, course, and prognosis between patients.

5819 INDUCED ATROPHIC GASTRITIS FOR THE TREATMENT OF PEPTIC ULCER. (E.) Rodriguez-Olleros, A. (U. Puerto Rico Sch. Pharm., Santurce), F. Febles Vizcarrondo and J. F. Taveras. *Am. J. Gastroenterol.* 56(1):52-60, 1971.

Atrophic gastritis was induced in 7 patients with duodenal ulcer by autosensitization with gastric proteins in an attempt to find a new treatment for peptic ulcer. All patients experienced a marked reduction of basal acidity, as well as acidity produced by maximum histamine stimulation. After 3 months of treatmemt, all patients showed various degrees of atrophy, including a decrease in mucosa thickness, a rarefied gland density and a degeneration of specific cells which had become unrecognizable in certain glands. There was marked infiltration mainly of lymphocytes. Gastric atrophy and the intense hypochlorhydria were restored to normal 5 months after discontinuing the injections. In 3 patients who received booster injections every 15-20 days for 9 months, the persistence of the intrinsic factor was indicated by Schilling test values of 12, 22 and 17.7% resp. Urinalysis, hemograms and chemical blood tests were unchanged by this treatment.

5820 THE EFFECT OF VASOACTIVE AGENTS ON STRESS-INDUCED GASTRIC HEMORRHAGE IN THE RAT. (E.) Brodie, D. A. (Merck Inst. Ther. Res., West Point, Pa.) and K. F. Hooke. *Digestion* 4(4):193-204, 1971.

Four vasodepressors: isoproterenol, phenoxybenzamine sodium nitrite and diazoxide had dose-related effects for the reduction of cold-plus-restraint-induced gastric hemorrhage. However, only a 4 mg/kg dose of histamine and no tested doses of methacholine (0.001-16.0 mg/kg) significantly reduced the incidence of stress-induced gastric hemorrhage. Of 4 vasopressor agents studied, clonidine, vasopressin, angiotensin and norepinephrine, only the first produced a significant reduction in the incidence of gastric hemorrhage. A synergistic effect was found between vasopressin, angiotensin and norepinephrine and the individual stresses of cold or restraint. In the acute fistula rat all vasopressors or vasodepressors reduced at least one parameter of gastric secretion in unstressed animals. No relationship was found between the effect of vasoactive drugs on stress-induced gastric hemorrhage and the degree of alteration of blood pressure. Gastric hemorrhage produced by cold-plus-restraint stress apparently occurs independently of the amount of acid secreted into the stomach. Reduction in gastric hemorrhage incidence by various vasodepressor drugs suggests that some change in mucosal vascularity may counteract stress-induced gastric hemorrhage.

5821 TREATMENT AND MORTALITY OF PERFORATED PEPTIC ULCER: A SURVEY OF 852 CASES. (E.) Cohen, M. M. (Vancouver Gen. Hosp., British Columbia, Canada). *Can. Med. Assoc. J.* 105(3): 263-269-282, 1971.

Between 1959-1968, 852 perforations in 840 individuals (10 per 100,000 population) with peptic ulcers occurred in the Greater Vancouver area. The male:female ratio was 3.4:1. Simple closure was the standard treatment of pyloroduodenal perforation, and definitive emergency surgery was rarely performed. The ratio of pyloroduodenal perforations to gastric perforations was 8:1; gastric perforation patients were older. In 737 of 765 cases treated surgically the length of time between perforation and operation was determined and analyzed. There was an overall mortality rate of 18.3%, but an operative mortality of 9%, most of the nonoperative mortalities being due to misdiagnosis. Both the overall and operative mortality rates increased with age and in women. Of 4.7% of cases who had definitive emergency surgery, 12.5% died. In 81% of cases who received simple closure of the perforation the operative mortality was 8%. In 87 (56%) of the fatalities no operation was performed. Gastric perforation carried a far greater risk than pyloroduodenal perforation, both for overall and operative mortality.

5822 GASTRIC STASIS AFTER VAGOTOMY AND PYLOROPLASTY. (E.) Hoeffel, J. C. (Univ. Hosp., Nancy, France), D. Benoit, J. Fays, P. Gaucher and R. Moeller. *Am. J. Surg.* 122(3): 365-367, 1971.

The clinical and radiologic patterns in 4 patients with gastric stasis as a complication of vagotomy were very similar. Chronic dyspeptic symptoms developed after vagotomy and pyloroplasty for duodenal ulcer. All patients were men from 30-63 yr of age who had had ulcers for many years and who were in serious clinical condition at the time of operation. Usually these patients complain for months and years after operation of epigastric bloating, distension, and belching. Diarrhea was noted once. Radiographic study revealed slow and incomplete emptying of the stomach which was hypotonic and hypokinetic. In all cases, the antrum was not homogeneous with lacunar aspects, although the patients were fasting. In one case, a recurrent phytobezoar appeared. Apparently gastric stasis secondary to vagotomy is responsible for the above symptoms. Treatment is difficult, but is only medical due to the absence of signs of occlusion.

5823 STOMAL OBSTRUCTION AFTER VAGOTOMY IN THE TREATMENT OF OBSTRUCTING PEPTIC ULCER. (E.) Cerise, E. J. (Tulane U. Sch. Med., New Orleans, La.) and R. W. Busuttil. *Am. J. Surg.* 122(3):371-374, 1971.

A retrospective evaluation of postoperative gastric atony was made on 40 patients operated upon for obstructing duodenal ulcer over a period of 10 yr. Postoperative gastric atony developed in only 1 of 40 patients studied; this patient had a partial pyloric obstruction and underwent antrectomy and vagotomy. In none of the 8 patients undergoing subtotal gastrectomy did delayed gastric emptying develop. Duration of nasogastric suction averaged 120 hr and postoperative hospitalization averaged 10½ days. Antrectomy with vagotomy was performed on 32 patients for pyloric obstruction with postoperative gastric retention developing in the previously mentioned case (3.1% incidence). The duration of gastrointestinal decompression averaged 120 hr in this group and length of hospital stay averaged 10 days. Although there is a slightly lower incidence of atony in those patients treated by subtotal gastrectomy, antrectomy and vagotomy is the procedure of choice since this procedure is not associated with the serious nutritional and metabolic disturbances frequently encountered following subtotal gastrectomy.

5824 EVALUATION OF SURGICAL TREATMENT FOR DUODENAL ULCER. A PROSPECTIVE RANDOMIZED STUDY. (E.) Irani, F. A. (VA Hosp., Allen Park, Mich.), E. Berkas and Z. Steiger. *Am. J. Surg.* 122(3):374-377, 1971.

Of 168 operative cases reviewed in a prospective randomized study between 1962 and 1965, all 85 patients who had pyloroplasty and vagotomy survived the operation, whereas 2 of 62 patients who had a vagotomy and hemigastrectomy died as a consequence of surgery. Morbidity including late incisional hernia and evisceration was greater in the vagotomy ahd hemigastrectomy group. Follow up studies from 3-6 yr obtained on 131 patients revealed that 70% of the patients undergoing vagotomy and pyloroplasty had desirable results, according to a modified Visick classification, compared to 74% of those undergoing vagotomy and hemigastrectomy. Six patients in the vagotomy and pyloroplasty group had recurrent ulcers, not seen in the vagotomy and hemigastrectomy group. Although vagotomy and pyloroplasty was a safer operation, hemigastrectomy appeared to protect against an incomplete vagotomy.

5825 THE EFFECT OF 2:2-DIPHENYL-4-N-HEXAMETHYLENIMINO-BUTYRAMIDE METHIODIDE ON EXPERIMENTAL CHRONIC ULCER IN GLANDULAR STOMACH OF RATS. (E.) Hisamatsu, T. (Meiji Seika Kaisha Res. Labs., Yokohama, Japan), T. Nakazawa and T. Koeda. *Jap. J. Pharmacol.* 21(2):139-154, 1971.

The curative effect of 2:2-diphenyl-4-N-hexamethylenimino-butyramide methiodide (R-661) on chronic gastric ulcers was studied in rats in which lesions were produced by the clamping-cortisone method. The ulcers so produced were similar to human ulcers, even histologically. When R-661 was administered in a dose of 3 mg/kg/day s.c. for 30 days, the average extent of healing and mucosal regeneration was also considerably high. Histologically the recovery state of the lesions was excellent in the treated group. The curative effect of R-661 seemed to increase directly with the duration of the treatment after a certain period. R-661 may have blocked the impulse conduction in the parasympathetics and indirectly protected the regenerative mucosa from the secretion of gastric juice at the time of ulcer recovery.

5826 A METHOD FOR THE PRODUCTION OF GASTRIC ULCERATION IN THE RAT. (E.) Yu, J.-Y. (Natl. Taiwan U. Coll. Med., Taipei). *J. Formosan Med. Assoc.* 70(2):63-72, 1971.

A simple method for the rapid production of gastric ulceration in the rat using psychological stress and eliminating physical factors is presented. When rats were encaged on a water surface, gastric lesions were demonstrated in 67% (12 of 18) at the end of 4 hr, in 78% (14 of 18) after 7 hr and in all of 18 rats after 24 hr. Two control groups were used: one in which all 4 limbs of the rats were tied to a wire mesh within the cage, and another in which the animals were similarly restrained and immersed up to the breast in water of 25° C. In the first control group the incidence of gastric lesions after 4, 7, and 24 hr were 13.1%, 26.7%, and 86.7%, resp. In the latter control group these values were 80%, 86.7%, and 100%, resp.; however, in the 24 hr group 5 out of 15 rats died during the experiment due to a lowering of body temperature. In all 3 groups the ulcers were found in the glandular part of the stomach and predominantly in the gastric body. Animals weighing over 200 g did not show the same consistency in lesion production, however, they did show uniformity if starved for 72 hr before the experiment. Vagotomy did not prevent ulcer formation by the first method. The lesions produced by this method were completely healed in less than 4 days.

5827 PRE- AND POSTOPERATIVE "DUMPING STUDIES" IN PATIENTS WITH PEPTIC ULCER. (E.) Hinshaw, D. B. (Loma Linda U. Sch. Med., Calif.), R. J. Thompson, Jr. and B. W. Branson. *Am. J. Surg.* 122(2):269-274, 1971.

Preoperative and postoperative dumping studies were performed on 130 and 410 patients with peptic ulcer, resp., by the intrajejunal injection (preoperative group) or p.o. administration (postoperative group) of hypertonic glucose solutions. Preoperative patients' reactions were distributed as follows: 21% negative; 42% mild; 27% moderate which fully simulated dumping attacks but not to a maximal degree; and 10% severe which were similar to the moderate reactions but more intense. The degree of increase in peripheral blood flow and skin temperature correlated closely with the observed clinical reactions. In the postoperative group, 187 had vagotomy and pyloroplasty, 88 had vagotomy and gastric resection, and 135 had resection without vagotomy. After vagotomy and pyloroplasty there was much less tendency for moderate or severe dumping symptoms to develop as opposed to those after gastric resection, particularly when more than antrectomy was performed. Fifty-three of

60 patients studied before and after surgery had the same type of clinical reaction to the hypertonic glucose test solution during both studies; the other 7 had milder reactions.

5828 "STRESS ULCERS" IN THE CAT AND THE EFFECT OF SPLANCHNIC NERVE SECTION. (E.) Gilsdorf, R. B. (Minneapolis VA Hosp., Minn.) and R. D. Mooney. *Curr. Top. Surg. Res.* 3:465-475, 1971.

The effect of sepsis, laparotomy and bilateral splanchnic nerve section on the incidence and character of stress-induced gastric or duodenal ulcers was studied in the cat. Four days after treatment, there was no significant difference in the incidence of ulcers between cats subjected to restraint alone (50%), those subjected to restraint and sepsis (45%), and those subjected to restraint and laparotomy (60%). However, only 3 of 14 cats (21%) developed ulcers following splanchnic nerve section. The mortality rates for these groups were 52%, 85.4%, 100%, and 47.4%, resp. Thus, sepsis was not influential in the formation of ulcers while splanchnic nerve section was effective in decreasing the incidence of ulcers resulting from the abdominal surgery.

5829 MECHANISMS OF STRESS-INDUCED STOMACH ULCERATIONS IN RESTRAINED RATS. MORPHOLOGICAL AND FUNCTIONAL STUDIES. (Ger.) Klein, H. J. (U. Cologne Pathol. Inst., Germany), T. Gheorghiu, G. Hübner and M. Eder. *Virchows Arch.* [*Pathol. Anat.*] 352(3):195-208, 1971.

Functional, gross and microscopic studies on 49 totally restrained male Wistar rats (200 g) revealed 3 phases in the development of gastric lesions. The first "adrenergic phase" lasting approximately 3 hr is characterized by a constriction of the smooth muscles of the arterioles, thickening of endothelial cells and almost complete lumenal closing. The resulting disturbances in circulation cause the following second "cholinergic-humoral phase" consisting of severe hypoxia with trophic changes in the mucosa and stasis in the enlarged capillaries. There is also a marked increase in acid production during this phase (4-6 hr of restraint). The volume of gastric secretion was reduced in comparison with controls but HCl concentration increased to over 300% in comparison to normal basal values. Strong contraction of the gastric wall during this phase results in a close contact of the stagnant hyperacid gastric juice with the mucous membrane and causes the third "lesion phase", (approx. 1 hr after peak acid production) consisting of erosions and ulcerations of the gastric mucosa.

5830 GASTRIC SURGERY FOR DUODENAL ULCER: BILLROTH II PROCEDURE AND VAGOTOMY IN 104 PATIENTS. (E.) deNiord, R. N. (Lynchburg, Va.), S. N. Harris, Jr. and F. B. Teague, Jr. *Am. Surg.* 37(9):578-582, 1971.

Billroth II procedure and truncal vagotomy was performed on 104 patients with chronic duodenal ulcers, repeat bleeding episodes, obstructive symptoms or perforation over a period of 10 yr; a 35-yr follow-up was obtained. Most common indications for operation were recurrent bleeding episodes, intractability of symptoms consisting of persistent indigestion and pain, and symptoms of chronicity associated with duodenal cicatrix or perforation. Of 104 patients, 3 deaths (2.8%) occurred postoperatively, 2 of the deaths being cardiac in nature and 1 resulting from duodenal blowout. Despite a wide-open Polya anastomosis no severe dumping syndrome was seen and only 4 had symptoms approaching postprandial discomfort (weakness, diaphoresis, palpitations). There were 12 s.c. wound infections, 4 incisional hernias and 1 pancreatic pseudocyst. Recurrent ulcer occurred in 3 patients, 2 of whom were shown later to have Zollinger-Ellison syndrome. There is apparently little need to resect difficult duodenal ulcers because of the complications that can ensue and the prompt healing of these ulcers when appropriate gastric bypass is performed.

5831 ULCEROGENIC POTENTIAL OF THE INCOMPLETELY RESECTED ANTRUM. (E.) Harrison, R. C. (Vancouver Gen. Hosp., British Columbia, Canada) and J. L. Stoller. *Am. J. Surg.* 122(2):198-203, 1971.

The effect of incomplete proximal antrectomy (one inch remaining) and vagotomy on gastric acid secretion was studied in dogs. In the 4 dogs with incomplete antrectomy that were fully studied, 3 had a reduction in Heidenhain pouch secretion and 1 an increase. None of the animals had narrowing at the gastroduodenal anastomosis. The average secretion after partial antrectomy and vagotomy was 60% of preoperative levels, while after complete antrectomy and vagotomy the secretion was 11% of normal. Because the daily variation in pouch secretion was large, the observed differences were not statistically significant. In 2 animals treated sequentially with incomplete antrectomy, with vagotomy and then complete antrectomy, significant differences in acid secretion were observed. Identification of the antrum-corpus junction seems to be important in certain operative procedures.

5832 EXPERIMENTAL STUDY OF THE GASTROTROPIC AND ANTISECRETORY EFFECTS OF PROGLUMIDE AND BUSCAPIN [N-BUTYLSCOPOLAMMONIUM BROMIDE] IN SHAY RATS IMMOBILIZED FOR 24 HOURS. (Sp.) Aznar Lopez, J. (C. H. Boehringer Sohn Ingeljeim Inst. Exp. Med., Barcelona, Spain), R. Monfort Albelda and F. Sanchez de la Cuesta y de Alarcon. *Med. Esp.* 65(386):332-337, 1971.

The volume of gastric secretion was significantly lower in pylorus-ligated rats immobilized for 24 hr than in nonimmobilized pylorus-ligated rats.

N-butylscopolammonium bromide (BSB; 10-30 mg/kg s.c.) inhibited development of gastric ulcers, but proglumide (250-750 mg/kg/s.c.) had no effect and did not potentiate the action of BSB. Significant decreases in the volume of gastric juice occurred when these rats were given proglumide (750 mg/kg) together with BSB (20 or 30 mg/kg). Neither of these drugs had a significant effect on the pH of gastric juice, but proglumide (500 and 750 mg/kg) caused decreases in the secretion of free and total acid.

5833 GASTRIC MUCOSAL BARRIER. (E.) Ivey, K. J. (Roy. Prince Alfred Hosp., Camperdown, Australia). *Gastroenterology* 61(2): 247-257, 1971.

The nature and physiologic properties of the gastric mucosal barrier and the part it plays in regulating hydrogen ion absorption were reviewed with special focus on its role in patients with gastric ulcers, pernicious anemia and stress ulcers. Decrease in the acidity of solutions instilled into the normal stomach is mainly due to back-diffusion of hydrogen ions and replacement by sodium ions across the gastric mucosa. Agents such as aspirin and bile salts, which have been shown to alter the ionic permeability of the gastric mucosa in normal human subjects, increase back-diffusion of hydrogen ions. This may be accompanied by protein loss and bleeding into the lumen. Increased back-diffusion of hydrogen ions through gastric mucosa produces mucosal damage, this perhaps explaining the susceptibility of antral mucosa to gastric ulcerations. Increased ionic permeability due to chronic aspirin intake and/or increased bile reflux may explain the role of these agents in the pathogenesis of gastric ulcer disease. Increased back-diffusion of hydrogen ions as occurs in some patients with gastric ulcer, chronic gastritis, rheumatoid arthritis, and stress ulcers (acute erosive gastritis) may play a role in the pathogenesis of the mucosal lesion and the associated hyposecretion of acid.

5834 PERFORATING ULCER IN A DUODENAL DUPLICATION. (E.) Dickinson, W. E., S. M. Weinberg and F. Vellios (U. Texas Southwestern Med. Sch., Dallas). *Am. J. Surg.* 122(3): 418-420, 1970.

5835 EARLY SELECTION OF PATIENTS FOR DUODENAL ULCER SURGERY: A NEW METHOD UTILIZING pH TELEMETRY. (E.) Yarbrough, D. R., III (Med. U. South Carolina, Charleston), J. C. McAlhany, Jr. and M. G. Weidner, Jr. *Curr. Top. Surg. Res.* 3:417-424, 1971.

5836 JAUNDICE AS A COMPLICATION OF DUODENAL ULCER. (E.) Onstad, G. R., N. A. Christensen and L. A. Smith. *Surg. Clin. North Am.* 51(4):885-892, 1971.

5837 FALSE ANEURYSM ASSOCIATED WITH GASTRIC ULCER. REPORT OF A CASE. (E.) Clemens, F. (Cent. Hosp., Vasteras, Sweden). *Radiology* 101(1):85-86, 1971.

5838 BASAL GASTRIC SECRETION AND PEROPERATIVE DETERMINATION OF GASTRIC ACID SECRETION IN SURGICAL TREATMENT OF PEPTIC ULCER. (Sp.) Diez Cascon, A. (Milit. Hosp., Barcelona, Spain), J. Vidal Sans and J. Guerrero. *Rev. Esp. Enferm. Apar. Dig.* 34(6):595-628, 1971.

5839 CONSIDERATION OF THE TREATMENT OF PEPTIC ULCER. (Sp.) de Miguel, J. *Rev. Esp. Enferm. Apar. Dig.* 34(6):629-640, 1971.

5840 PERITONEAL FOREIGN BODY GRANULOMATOSIS AFTER PERFORATING DUODENAL ULCER. REPORT OF A CASE. (E.) Myllarniemi, H. (U. Helsinki 2nd Dept Surg.). *Acta Chir. Scand.* 137(2):189-191, 1971.

5841 RADIOGRAPHIC STUDIES OF GASTRIC ULCER SCAR. (Jap.) Komata, N. (Nippon Med. Sch., Tokyo). *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 30(10):64-84, 1970.

5842 CLINICAL OBSERVATION OF THREE CASES OF GIANT ULCER OF THE STOMACH. (Bul.) Mintchev, M. and I. Badev. *Med. Probl. (Plovdiv)* 22(5-6):77-83, 1970.

5843 DISORDERS AFTER PARTIAL GASTRECTOMY. REVIEW OF 100 CASES. (Por.) Pinto Correia, J. (Sch. Med., Lisbon, Portugal), E. Monteiro and A. Baptista. *J. Soc. Cienc. Med. Lisboa* 134(8):771-794, 1970.

5844 GASTRIC CARCINOMA DEVELOPING AFTER SURGERY FOR PEPTIC ULCER. (E.) Graves, H. A., Jr. (Vanderbilt U. Sch. Med., Nashville, Tenn.) and J. L. Herrington, Jr. *Am. Surg.* 37(2):73-76, 1971.

5845 STUDY OF THE ANTIULCER PROPERTIES OF DOGMATIL (SULPIRIDE) IN GASTROENTEROLOGIC DISEASES. (Fr.) Maes, M. J. *J. Med. Chir. Prat.* 142(13):483-494, 1971.

5846 SUBDIAPHRAGMATIC VAGOTOMY. A TECHNICAL MANEUVER. (E.) Smith, E. B. (St. Francis Gen. Hosp., Pittsburgh, Pa.). *J. Natl. Med. Assoc.* 63(1):15-39, 1971.

5847 THE RETAINED GASTRIC ANTRUM: CLINICAL CONSIDERATIONS. (E.) Van Heerden, J. A. (Univ. Minnesota Mayo Grad. Sch. Med., Rochester), P. E. Bernatz and R. A. Rovelstad. *Mayo Clin. Proc.* 46(1):25-28, 1971.

5848 CLINICAL EXPERIENCE WITH ACUTE PEPTIC GASTROINTESTINAL ULCERS. (E.) David, E. (U. Minnesota Mayo Grad. Sch. Med., Rochester), D. C. McIlrath and J. A. Higgins. *Mayo Clin. Proc.* 46(1):15-24, 1971.

5849 THE ROLE OF THE VAGUS IN HEMORRHAGES FROM DUODENAL ULCERS. (Hun.) Alant, O. (Semmelweis Med. U., Budapest) and G. Zsigmond. *Magy. Sebesz.* 24(1):33-37, 1971.

5850 TREATMENT AND PROPHYLAXIS OF PEPTIC ULCER IN CHILDREN. (Rus.) Netakhata, Z. N. *Pediatriia (Mosk.)* 50(5):22-26, 1971.

5851 ADVANCES IN TREATMENT OF PERFORATED GASTRIC AND DUODENAL ULCER. (Pol.) Goral, R. (Med. Acad Surg. Inst., Poznan, Poland). *Pol. Tyg. Lek.* 26(8):285-287, 1971.

5852 ULCER OF THE STOMACH AS STAGNATING ULCER. INDICATIONS AND RESULTS OF CONSERVATIVE SURGICAL TREATMENT. (It.) Imperati, L. (United Hosp., Foggia, Italy), C. Natale and A. Altieri. *Rif. Med.* 85(5):125-132, 1971.

5853 ACIDITY OF GASTRIC JUICE AND CARBOHYDRATE TOLERANCE IN CHRONIC PEPTIC ULCER. (Pol.) Bojanowicz, K. (Med. Acad. 1st Intern. Dis. Clin., Lodz, Poland) and A. Zubowski. *Wiad. Lek.* 24(4):301-307, 1971.

5854 DEOXYRIBONUCLEASE ACTIVITY OF THE DUODENAL JUICE IN SOME DIGESTIVE TRACT DISEASES. (Rus.) Nuzhina, V. S. *Ter. Arkh.* 43(4):36-40, 1971.

5855 IRON AND COBALT METABOLISM IN PEPTIC ULCER PATIENTS. (Rus.) Paraschak, A. P. *Ter. Arkh.* 43(4):25-28, 1971.

5856 CONTENT AND DISTRIBUTION OF GLYCOGEN AND LIPIDS IN THE MUCOUS MEMBRANE OF THE BODY AND PYLORIC REGION OF THE STOMACH IN DUODENAL ULCER PATIENTS. (Rus.) Nalivaiko, D. G., E. M. Tantsiura and I. V. Baltaitis. *Ter. Arkh.* 43(4):29-31, 1971.

5857 GLUCOCORTICOID AND ANDROGENIC ACTIVITY OF THE ADRENALS IN GASTRIC AND DUODENAL ULCER. (Rus.) Mizin, V. T. *Ter. Arkh.* 43(2): 68-73, 1971.

5858 THOMAS BLIZARD CURLING: THE MAN AND THE ULCER. (E.) Lamb, F. S. (Wayne State U. Sch. Med., Detroit, Mich.), Y. J. Silva and A. J. Walt. *Surgery* 69(4):646-649, 1971.

5859 PERFORATION DUE TO GASTRIC AND DUODENAL ULCERS. (Jap.) Namiki, M. (Hokkaido U. Sch. Med., Sapporo, Japan), T. Sekiya and T. Morooka. *Stomach Intest. (Tokyo)* 6(4):429-436, 1971.

5860 RADIOTELEMETRIC INDICES OF THE ACID FORMING FUNCTION OF THE STOMACH IN PATIENTS WITH PEPTIC ULCER DEPENDING UPON THE STAGE OF THE DISEASE. (Rus.) Troian, N. F. *Ter. Arkh.* 43(4):22-25, 1971.

See also numbers: 5510, 5636, 5751, 5893, 5861 FREQUENCY OF WOUND COMPLICATIONS AFTER SURGERY FOR SMALL BOWEL OBSTRUCTION. (E.) Larsen, E. and W. J. Pories (Cleveland Metropol. Gen. Hosp., Ohio). *Am. J. Surg.* 122(3): 384-386, 1971.

The records of 143 patients who underwent surgery for small intestine obstruction between 1959 and 1969 revealed a 20% incidence in wound complications. There were 24 suppurative wound infections, 3 wound dehiscences and 1 case of cellulitis. Entry into the intestine (36 intestine resections, 10 perforations and 8 enterostomies for decompression) was associated with a high incidence of wound infection (76%). Antibiotics did not appear to prevent wound complications with 79% of treated patients developing wound complications. The 79 patients whose symptoms were present longer than 48 hr accounted for 68% of all wound problems. There was no relationship between wound complications and location of obstruction or patient sex or age. Early operation, careful technique and perhaps delayed primary wound closure, especially in those patients requiring enterostomy or resection, should help to reduce the incidence of wound abscess and dehiscence in these patients.

5862 DUODENAL OBSTRUCTION BY THE SUPERIOR MESENTERIC ARTERY IN BEDRIDDEN COMBAT CASUALTIES. (E.) Wayne, E. (U. Colorado Sch. Med., Denver), R. E. Miller and E. Eiseman. *Ann. Surg.* 174(3):339-345, 1971.

Radiologic examinations performed on 5 bedridden combat veterans revealed gastroduodenal dilatation and obstruction to passage of contrast material through the third portion of the duodenum in all patients. Fluoroscopy revealed peristaltic waves pounding through a dilated duodenum. The distance from the superior mesenteric artery (SMA) at the point of duodenal crossing to the anterior border of the aorta in all 5 patients was 2 or 3 mm as compared to normal SMA to aorta distances of 7 to 20 mm. Each patient had been immobilized for prolonged time periods (8 to 12 weeks) prior to this study and the average weight loss was 65 pounds during this period. Contrast roentgenograms were helpful in the early diagnosis of duodenal obstruction by the SMA in these patients. Oral feeding in a face-down position on a Stryker Frame relieved the obstruction and restored normal nutrition without the need for surgical bypass.

5863 ORAL GLUCOSE IN REDUCTION OF JEJUNOSTOMY EFFLUENT. (E.) Kendall, M. J. (Queen Elizabeth Hosp., Birmingham, England) and C. F. Hawkins. *Lancet* 2(7721):411-412, 1971.

A case history was reported of a 65-yr-old male with ulcerative colitis who had a massive (1/3) resection of the small intestine and colectomy. The main problem in this patient was a large fluid loss (5-6 liters/day) for which there was no possibility of compensatory increase in absorption by the colon. Normal measures (i.v. replacement and subsequent oral salt supplements) to control fluid loss were uniformly unsuccessful. Since this situation was very similar to that produced by cholera, treatment with oral glucose (100 g/day for 12 months) was initiated and shown to be effective. Glucose enhances the absorption of water and electrolytes, presumably by potentiating the sodium pump. Neither fructose, galactose, nor a combination of glycine and glucose were of any value when compared to glucose alone.

5864 MANAGEMENT OF GASTROINTESTINAL FISTULAS. (E.) Sheldon, G. F. (U. California Dept. Surg., San Francisco), B. N. Gardiner, L. W. Way and J. E. Dunphy. *Surg. Gynecol. Obstet.* 133(3):385-389, 1971.

The records of 51 patients treated for gastric or duodenal fistulas (9 patients), fistulas of the small intestine (29) and colonic fistulas (13) since 1964 were reviewed. The underlying diseases most commonly observed in these patients were duodenal ulcer, carcinoma of the cervix, uterine myomas, regional enteritis and ulcerative colitis. The primary cause of the fistula was surgical complications in 36 cases (70%). A specific but flexible plan of management of these patients included adequate nutrition by i.v. hyperalimentation, control of infection, balance of electrolytes, delineation of the anatomy of all fistulas by various diagnostic techniques, and surgery only to control sepsis or if the fistula failed to close. Closure of the fistula was performed in 77% (7) of the gastroduodenal group, 76% (22) of the small intestine group, and 100% (13) of the colon group; the mortality due to the fistula being 23%, 14%, and 0%, resp. Patients with fistulas of the stomach and duodenum (high output fistulas) had an overall mortality of 16% (6 of 38), while 76% were successfully treated and 8% had minimal fistula drainage.

5865 SYMPATHOLYTIC TREATMENT OF "PARALYTIC" ILEUS. (E.) Petri, G. (Univ. Med. Sch., Szeged, Hungary), J. Szenohradszky and K. Pórszász-Gibiszer. *Surgery* 70(3):359-367, 1971.

A group of 211 surgical patients with "paralytic" ileus were treated with chlorpromazine (98), trifluperidol (71), or a combination of one of these drugs and neostigmine or distigmine. Chlorpromazine and trifluperidol enhanced peristaltic activity in normal controls, especially in the gastric wall and jejunum, and restored peristalsis in those with "paralytic" ileus. One injection was usually sufficient to relieve ileus. The effect of the drug was enhanced by an enema given 30-40 min after the injection. Both drugs proved particularly helpful in relieving gastric retention associated with "paralytic" ileus. Patients suffering from peritonitis also responded to the sympatholytic treatment with restored bowel sounds, passage of gas and frequently of stool. Good treatment results were found in 80 out of 98 for chlorpromazine, 68 of 71 for trifluperidol, and 42 of 42 for combined treatment.

5866 RESISTANCE TO TETRODOTOXIN IN THE ISOLATED ILEUM OF THE RAT. (E.) Goldenberg, M. M. (Norwich Pharm. Co., N. Y.). *J. Pharm. Pharmacol.* 23(8):621-622, 1971.

5867 INTESTINAL MALROTATION WITH MIDGUT VOLVULUS OCCURRING WITH AGANGLIONOSIS OF COLON AND TERMINAL ILEUM IN A NEWBORN INFANT. (E.) Fonkalsrud, E. W. (UCLA Sch. Med., Los Angeles, Calif.), A. R. Christiansen, S. Park and M. T. Gyepes. *Am. Surg.* 37(9):573-577, 1971.

5868 THE MASSIVE RESECTION OF THE SMALL INTESTINE. STUDY OF THREE CASES. I. SURGICAL AND ANATOMICAL ASPECTS. (Fr.) Kestens, P. J. (Leopold III laan 39, Heverlee, Belgium), R. Fiasse, J. C. Orban and F. Meersseman. *Acta Gastroenterol. Belg.* 34(4-5):368-385, 1971.

5869 THE MASSIVE RESECTION OF THE SMALL INTESTINE. STUDY OF THREE CASES. II. METABOLIC AND DIETETIC ASPECTS. (Fr.) Fiasse, R. (P. Poulletlaan 5, Kessel-Lo, Belgium), P. J. Kestens, C. Harvengt, L. Piret and C. Nagantde Deuxchaisnes. *Acta Gastroenterol. Belg.* 34(4-5): 386-404, 1971.

5870 METABOLIC STUDY AFTER RESECTION OF THE MESENTERIC SMALL INTESTINE AND THE RIGHT HEMICOLON ON ACCOUNT OF MESENTERIC INFARCT. (Fr.) Kiekens, R. (Brugmann U. Hosp., Brussels, Belgium), E. Welch and C. Debatice. *Acta Gastroenterol. Belg.* 34(4-5):361-367, 1971.

5871 HUMAN GASTRIC SECRETORY STUDIES FOLLOWING DISTAL SMALL BOWEL BYPASS. (E.) Buchwald, H. (U. Minnesota Dept. Surg., Minneapolis) and R. L. Varco. *Curr. Top. Surg. Res.* 3:409-415, 1971.

5872 DISSEMINATED INTRAVASCULAR COAGULATION, NONBACTERIAL THROMBOTIC ENDOCARDITIS AND ADULT PULMONARY HYALINE MEMBRANES - AN INTERRELATED TRIAD? REPORT OF A CASE FOLLOWING SMALL BOWEL RESECTION FOR A STRANGULATED INGUINAL HERNIA. (E.) Horwitz, C. A. (Mt. Sinai Hosp., Minneapolis, Minn.) and P. C. J. Ward. *Am. J. Med.* 51(2):272-280, 1971.

5873 ELEMENTAL DIET IN THE MANAGEMENT OF THE INTESTINAL LESION PRODUCED BY 5-FLUOROURACIL IN THE RAT. (E.) Bounous, G. (Univ. Hosp. Ctr., Sherbrooke, Quebec, Canada), J. Hugon and J. M. Gentile. *Can. J. Surg.* 14(5):298-311, 1971.

5874 DIFFERENTIATION OF ACUTE NONSPECIFIC JEJUNITIS FROM MECHANICAL SMALL BOWEL OBSTRUCTION. (E.) Clemett, A. R. (U. Miami Sch. Med., Fla.) and D. A. Inkeles. *Radiology* 101(1): 87-91, 1971.

5875 INTESTINAL DISORDERS IN HYPOTHYROIDISM. CLINICAL AND MANOMETRIC STUDY. (E.) (St. Pierre Hosp., Brussels, Belgium) and P. A. Bastenie. *Am. J. Dig. Dis.* 16(8):723-727, 1971.

5876 A CASE OF MULTIPLE INTESTINAL FISTULAS. (Sp.) Gajo Reyero, R., P. Mateu Simo and J. Puig Lacalle. *Barcelona Quir.* 14(5): 365-367, 1970.

5877 DIVERTICULOSIS OF THE SMALL INTESTINE. (Sp.) Suaya, H. (Sch. Med. Surg. Clin., Montevideo, Uruguay). *Cir. Uruguay* 40(3):219-228, 1970.

5878 LEFT PARADUODENAL HERNIA: REPORT OF TWO CASES. (E.) Singh, S. (Postgrad. Inst. Med. Educ. Res., Chandigarh, India), H. S. Sachdeva and I. C. Pathak. *Can. J. Surg.* 14(2): 148-150, 1971.

5879 LEFT PARADUODENAL HERNIA: A NEW APPROACH TO ETIOLOGY AND TREATMENT. (E.) Wilkinson, G. W. (Univ. Hosp., Saskatoon, Saskatchewan, Canada). *Can. J. Surg.* 14(2): 151-153, 1971.

5880 RETROPERITONEAL INJURY TO THE DUODENUM BY BLUNT ABDOMINAL TRAUMA: REPORT OF EIGHT CASES. (E.) Wilson, T. S. (U. Alberta Dept. Surg., Edmonton, Canada) and L. B. Costopoulos. *Can. J. Surg.* 14(2):114-121, 1971.

5881 ILEAL BYPASS IN THE TREATMENT OF SEVERE ESSENTIAL HYPERCHOLESTEROLEMIA. A REPORT OF TWO CASES. (Fr.) Clot, J. P., J. Rouffy, J. Loeper and M. Mercadier. *Chirurgie* 97(1):57-63, 1971.

5882 DUPLICATION CYST OF THE DUODENUM. (E.) Pecora, D. V. (VA Hosp., Richmond, Va.). *Am. Surg.* 37(2):95-96, 1971.

5883 EFFECT OF CHANGING CONCEPTS UPON THE DIAGNOSIS AND MANAGEMENT OF INTESTINAL ATRESIA. (E.) White, J. J. (Johns Hopkins U. Sch. Med., Baltimore, Md.), J. R. Esterly, P. Tecklenberg and J. A. Haller, Jr. *Am. Surg.* 37(1):34-43, 1971.

5884 PERITONEAL HYPERPLASIA WITH MEGA-OESOPHAGUS, MEGADUODENUM AND MEGAJEJUNUM. (Fr.) Fruchter, Z. (Copii Cent. Hosp., Bucharest, Rumania). *Ann. Radiol.* 14(3-4):314, 1971.

5885 LEIOMYOSARCOMA OF THE DUODENUM. (E.) Meyers, M. A. (Flower Fifth Ave. Hosp., New York, N. Y.). *Clin. Radiol.* 22(2):257-260, 1971.

5886 GROWING UP WITH JUVENILE GASTROINTESTINAL POLYPOSIS: REPORT OF A CASE. (E.) Ray, J. E. (Ochsner Clin., New Orleans, La.) and R. J. Heald. *Dis. Colon Rectum* 14(5):375-380, 1971.

5887 NODULAR LYMPHOID HYPERPLASIA OF THE SMALL INTESTINE AND COLON WITH GIARDIASIS. A CASE WITH BORDERLINE SERUM IgA LEVELS. (E.) Milano, A. M. (New York U. Med. Ctr., N. Y.), L. R. Lawrence and L. Horowitz. *Am. J. Dig. Dis.* 16(8):735-737, 1971.

5888 BLUNT TRAUMA TO THE SMALL BOWEL. (E.) Larmi, T. K. I. (U. Oulu Dept. Surg., Finland) and E. Vaaraniemi. *Int. Surg.* 55(1): 20-26, 1971.

5889 TELANGIECTASIA OF THE SMALL AND LARGE INTESTINES. (E.) Miller, J. M. (VA Hosp., Fort Howard, Md.) and A. A. Bulls, Jr. *J. Abdom. Surg.* 13(4):64-66, 1971.

5890 MESENTERIC ARTERY SYNDROME. (E.) Collins, H. L. *J. Abdom. Surg.* 13(3): 43-46, 1971.

5891 A MECHANISM OF THE KINK FORMATION WHICH PRECEDES INTUSSUSCEPTION. (E.) Reymond, R. D. (Johns Hopkins Hosp., Baltimore, Md.). *Invest. Radiol.* 6(1):61-64, 1971.

5892 GANGLIONEUROMATOSIS OF THE ILEUM. (Tur.) Imamoglu, I. (U. Ankara Med. Sch., Turkey) and A. Oruc. *Tip. Fak. Mec.* 23(5): 1461-1468, 1970.

5893 STANDARD TEST FOR ASSESSMENT OF THE RESORPTIVE FUNCTION OF THE SMALL INTESTINE UNDER CLINICAL CONDITIONS. (Rus.) Leschinski, I. A., V. V. Trusov and R. A. Plastinina. *Ter. Arkh.* 43(4):52-55, 1971.

5894 ILEAL INVAGINATION INTO THE CECUM DUE TO PRIMARY CANCER OF THE SMALL INTESTINE. (Rus.) Makarevitch, O. F. *Zdravookhr. Beloruss.* 17(2):83-84, 1971.

5895 EXAMINATION OF THE SMALL BOWEL. (E.) Merlo, R. B. *NC Med. J.* 32(2):62, 1971.

5896 INTERSTITIAL HEMATOMA OF THE DUODENUM. (Pol.) Wajda, T. (Med. Acad Inst. Radiol., Gdansk, Poland), P. Tomaszewski and O. Jankau. *Pol. Przegl. Radiol. Med. Nukl.* 35(1): 51-55, 1971.

5897 LEIOMYOSARCOMA OF THE SMALL INTESTINE REVEALED BY MESENTERIC ARTERIOGRAPHY. (Fr.) Etienne, J. P. (Broussais Hosp., Paris), J. Ecoiffier and M. Garbay. *Sem. Hop. Paris* 47(18):1189-1192, 1971.

5898 EXPERIMENTAL ENTERO-ARTERIOPLASTY IN THE DOG. (Fr.) Anglade, J. P. *Rev. Corps Sante Armees* 11(6):857-858, 1970.

5899 DIFFUSE ANGIOMATOSIS OF THE SMALL INTESTINE. (Fr.) Delavierre, P. (Broussais Hosp., Paris), J. Guerre and B. Letac. *Sem. Hop. Paris* 47(18):1187-1188, 1971.

5900 CHOLELITHIC INTESTINAL OBSTRUCTION. (Rus.) Beliaev, A. A. and A. I. Sveshnikov. *Vestn. Khir.* 106(2):24-27, 1971.

5901 ILEUS IN PUERPERIUM AND PREGNANCY. CASE PRESENTATION. (Ger.) Spallek, H. (Dist. Hosp., Finsterwalde, Germany). *Zentralbl. Gynaekol.* 93(5):157-160, 1971.

5902 GALLSTONE ILEUS. (Ger.) Keuntje, H. (Reg. Hosp., Cottbus, Germany). *Zentralbl. Chir.* 96(13):440-446, 1971.

5903 DUODENAL ATRESIA IN THE NEWBORN. (E.) Gourevitch, A. (United Birmingham Hosp., England). *Ann. R. Coll. Surg. Engl.* 48(3):141-158, 1971.

5904 ANGIOGRAPHY IN DUODENAL CARCINOMA. (E.) Olsson, O. (Univ. Hosp., Lund, Sweden). *Acta Radiol. [Diagn.] (Stockh.)* 11(2):177-194, 1971.

5905 MALIGNANT TUMORS OF THE SMALL BOWEL IN NEONATES PRESENTING WITH PERFORATION. (E.) El Shafie, M. (Alder Hey Child. Hosp., Liverpool, England), L. Spitz and S. Ikeda. *J. Pediatr. Surg.* 6(1):62-64, 1971.

5906 INTUSSUSCEPTION: 354 CASES IN 10 YEARS. (E.) Ein, S. H. (Hosp. Sick Child., Toronto, Ontario, Canada) and C. A. Stephens. *J. Pediatr. Surg.* 6(1):16-27, 1971.

5907 BOWEL ISCHAEMIA IN THE NEWBORN. (E.) Anonymous. *Med. J. Aust.* 1(9):457-458, 1971.

5908 PERFORATIONS OF THE SMALL INTESTINE. (It.) Grassi, G. and M. Marzi. *Minerva Med.* 62(6):277-278, 1971.

5909 EDEMATOUS INFLAMMATION OF THE ILEOCECAL VALVE IN A CHILD. (Pol.) Sztaba, R. (Med. Acad. Pediatr. Surg. Clin., Gdansk, Poland) and J. Karcz. *Pol. Tyg. Lek.* 25(50):1952-1954, 1970.

5910 RETICULOSARCOMA OF MECKEL'S DIVERTICULUM. (Cz.) Jirasek, J. (Hosp. Surg. Dept. Kladno, Czechoslovakia) and V. Poddany. *Rozhl. Chir.* 50(2):79-82, 1971.

See also numbers: 5454, 5637, 5638, 5680, 5681, 5682, 5945, 6043

REGIONAL ENTERITIS

5911 GRANULOMATOUS BOWEL DISEASE PRESENTING AS A BLADDER TUMOR. REPORT OF A CASE. (E.) Goldstein, M. J., D. Bragg and P. Sherlock (Mem. Hosp., New York, N. Y.). *Am. J. Dig. Dis.* 16(4):337-341, 1971.

A case of regional enteritis which presented as a bladder tumor is presented. The granulomatous lesions which were located in the terminal ileum and rectosigmoid areas extended to the bladder and gave the appearance of a vesical neoplasm with retrograde cystography and cystoscopy. At laparotomy, enteritis of the terminal ileum was noted with enteroenteric and enterocutaneous fistulas, together with a large inflammatory mass which consisted of terminal ileum with its mesentery adherent to the anterior wall and dome of the bladder. The terminal ileum and cecum were dissected free from the bladder, the terminal 3 feet of ileum were removed, and a right hemicolectomy was performed, with anastomosis of the remaining ileum to the transverse colon. Within 3 months the ileocutaneous fistula became smaller and finally closed.

5912 PSOAS ABSCESS IN CROHN'S DISEASE. (E.) Kyle, J. (Woodend Hosp., Aberdeen, Scotland). *Gastroenterology* 61(2):149-155, 1971.

In a series of 185 patients (Aberdeen, 1955-1969) with all types of Crohn's disease, there were 5 patients who developed psoas abscesses. Three of the 5 patients had severe intestinal disease as judged by a protracted and complicated clinical course. By contrast, 2 patients first presented with a psoas abscess already present, 1 having a groin lump and the other with flexion of her hip. Four other British patients of psoas abscess complicating Crohn's disease are known, most of whom had received steroids at some time. However, only 1 of the present 5 patients had received corticosteroids before a psoas abscess became established. Because of the almost complete eradication of tuberculosis, a common cause of psoas abscess, Crohn's disease is now the single most common cause of psoas abscess.

5913 MEDIASTINAL LIPOMATOSIS COMPLICATING STEROID THERAPY OF REGIONAL ENTERITIS. (E.) Schuman, B. M. (Henry Ford Hosp., Detroit, Mich.). *Gastroenterology* 61(2):244-246, 1971.

Mediastinal lipomatosis is reported arising in a regional enteritis patient maintained on a low daily dose of dexamethasone (0.75 mg) for about 4 yr. It is postulated that the classic pattern of obesity in hypercorticism be broadened to include various episternal and mediastinal fat deposits. Recognizing the existence of mediastinal lipomatosis as a complication of long-term corticosteroid therapy in patients with chronic enterocolonic disease will help avoid unnecessary surgical exploration of the thorax.

5914 SARCOIDOSIS ASSOCIATED WITH REGIONAL ENTERITIS (CROHN'S DISEASE). REPORT OF TWO CASES. (E.) Dines, D. E. (Mayo Clin., Rochester, Minn.), R. A. DeRemee and P. A. Green. *Minn. Med.* 54(8):617-620, 1971.

Cases are briefly presented of 2 males both with histological evidence of both sarcoidosis and regional enteritis of the distal ileum. Although the granulomatous lesions seen in both cases are essentially identical, their existence does not provide convincing evidence of a common cause. It was postulated that the coexistence of sarcoidosis and Crohn's disease in the same patient suggests that a provocative agent entered the respiratory and gastrointestinal tracts simultaneously.

5915 ADVERSE EFFECTS OF DIETARY GLUTEN IN FOUR PATIENTS WITH REGIONAL ENTERITIS. (E.) Rudman, D. (Emory U. Sch. Med., Atlanta, Ga.), J. T. Galambos, J. Wenger and J. L. Achord. *Am. J. Clin. Nutr.* 24(9):1068-1073, 1971.

All 4 cases of regional enteritis were adversely affected by the addition of 5-20 g gluten to a gluten-free diet for 3-8 days. Gastrointestinal bleeding occurred, and diarrhea and abdominal discomfort intensified in each patient; steatorrhea appeared in 3 and fever was seen in 2. The same program of gluten administration in 6 control subjects for 12 days had no effect. In all cases, adverse effects subsided gradually within 2-4 weeks after discontinuation of gluten. Gluten, implicated already in the etiology of nontropical sprue and celiac disease, may play a role in aggravating the intestinal lesion in regional enteritis.

5916 REGIONAL ILEITIS WITH FREE PERFORATION INTO THE PERITONEAL CAVITY TWICE: REPORT OF A CASE. (E.) Urca, I. (Beilinson Hosp., Petah Tiqva, Israel). *Dis. Colon Rectum* 14(4):310-312, 1971.

5917 THE MANAGEMENT OF CHRONIC CROHN'S DISEASE. (E.) Kyle, J. (Woodend Hosp., Aberdeen, Scotland). *Ulster Med. J.* 40(1):59-63, 1971.

5918 A CASE OF CROHN'S DISEASE. (Rus.) Piltsov. I. M. and I. K. Novikova. *Ter. Arkh.* 43(4):116-118, 1971.

5919 A CASE OF STENOSING ILEITIS (CROHN'S DISEASE) CAUSING TOTAL MECHANICAL INTESTINAL OBSTRUCTION IN A CHILD. (Rus.) Litvak, B. G. *Pediatriia (Mosk.)* 50(3):79-80, 1971.

5920 THE EARLY DIAGNOSIS OF CHRONIC CROHN'S DISEASE. (E.) Kyle, J. (Roy. Infirm., Aberdeen, Scotland). *Scott Med. J.* 16(3):197-201, 1971.

See also numbers: 5639, 5976, 6013, 6020, 6021

MALABSORPTION

5921 INTESTINAL ABSORPTION OF LACTOSE IN NIGERIAN ETHNIC GROUPS. (E.) Kretchmer, N. (Stanford U. Sch. Med., Calif.), O. Ransome-Kuti, R. Hurwitz, C. Dungy and W. Alakija. *Lancet* 2(7721):392-395, 1971.

Lactose tolerance was tested in 4 major tribal groups in Nigeria: non-dairy farming and non-milk drinking people such as the Yoruba and Ibo and in cattle raising, milk ingesting peoples in the north of Nigeria, the Hausa and Fulani. Of 41 Yoruba only 1 was lactose tolerant, with a rise in glucose of 22 mg/100 ml after lactose administration. The 17 Hausa had 76% malabsorption which was similar to levels in the town of Fulani (31). However, only 20% of nomadic Fulani showed malabsorption. The Ibo had the same degree (99%) of intolerance as the Yoruba. In the Yoruba there was a significant difference in ability to tolerate lactose between infants up to 1 month of age and those aged 2-4 yr and adults greater than 20 yr old. White Semites who were also studied were unable to absorb lactose, whereas Anglo-Saxons could do so. Individuals with lactose malabsorption showed no difficulty in their ability to hydrolyze sucrose. Malabsorption of lactose encountered after 2-3 yr of age is apparently genetically normal in man, whereas the ability to absorb lactose efficiently by adults from certain ethnic groups may be related to natural selection. Lactose-free milk should be given to children from regions where malabsorption is prevalent.

5922 PANETH CELL DEFICIENCY IN IDIOPATHIC STEATORRHEA. (Ger.) Otto, H. F. (U. Hamburg Pathol. Inst., Germany). *Beitr. Pathol. Anat.* 143(4):378-389, 1971.

Histological evaluation of jejunal biopsy material from 34 patients with celiac disease revealed complete Paneth cell atrophy in 6 patients. Jejunal abnormalities included shortened crypts, reduced mitotic activity, abnormalities of surface epithelium, dense infiltration of the lamina propria with lymphocytes and plasma cells. Corticosteroid therapy combined with a gluten-free diet resulted in a progressive restitution and normalization of the histologic picture in 4 of 6 patients. Two patients with complete absence of Paneth cells were resistant to this therapy and, on repeated examination showed extensive jejunal lesions including necrosis and desquamation of the epithelium and mucosal ulceration. Clinical and histomorphologic improvement was achieved in these 2 patients with antibiotic therapy. It is suggested that the disappearance of Paneth cells in celiac disease leads to a deficiency of lysozyme secretion which in turn causes a disturbance in bacterial homeostasis. This results in an ascending infiltration of the small intestines with organisms of the colon, increase in bacterial virulence, epithelial necrosis, ulceration of mucosa, resistance to therapy and a poorer prognosis.

5923 INTESTINAL DISACCHARIDASE ACTIVITY IN AN INFANT WITH LACTOSE INTOLERANCE.

(E.) Arashima, S. (Hokkaido U. Sch. Med., Sapporo, Japan), I. Matsuda, N. Sato and H. Yoshioka. *Helv. Paediatr. Acta* 26(2):215-219, 1971.

This infant was seen initially at 34 days of age because of vomiting and failure to thrive, with a weight loss of 150 g since birth. Most urine, cerebrospinal and blood parameters as well as an upper gastrointestinal roentgenological study were normal. Paper chromatography showed the urine sugar to be lactose and its excretion was estimated to be 600 mg/day. A mild generalized panaminoaciduria was also detected. An oral lactose tolerance test (2 g/kg) performed during the acute phase of the disease at 2 months of age showed a marked increase in intestinal absorption of lactose while a repeat test during the convalescent phase at 4 months of age showed a normal response. A small intestinal biopsy was performed with a Crosby capsule at 2 months of age. The histology of this specimen was normal. In this specimen, the level of disaccharidases was either normal (maltase) or elevated (lactase, sucrase). When the diet was changed to a sucrose formula there was still no increase in weight, while the addition of fructose milk led to a slight increase in weight and a gradual cessation of vomiting.

5924 MORPHOMETRIC STUDIES OF THE JEJUNAL MUCOSA.

(Ger.) Schenk, J. (Free U. Berlin Pathol. Inst., Germany). *Beitr. Pathol. Anat.* 144(1):80-100, 1971.

Measurements were made of the length of villi, depth of crypts, mucosal thickness, cell height in the columnar epithelium, and the mitotic index in 68 jejunal biopsies from normal subjects (30) and patients with partial (15) or subtotal (23) villose atrophy due to gluten-induced enteropathy. Discriminant analysis demonstrated that there are significant differences in these parameters between normal subjects and patients with subtotal villose atrophy but not between patients with partial and subtotal villose atrophy. In normal subjects the length of intestinal villi decreased with increasing age.

5925 COMPARATIVE MORPHOLOGICAL STUDIES OF THE INTESTINAL MUCOSA IN VARIOUS FORMS OF MALABSORPTION AND OTHER DISEASES IN CHILDREN.

(Ger.) Vogel, A. (Free U. Berlin Pathol. Inst., Germany). *Virchows Arch.* [*Pathol. Anat.*] 352(2):226-245, 1971.

Histological evaluation (length of crypts and villi, mitotic index, quantity of Paneth cells, cell type in the lamina propria) was performed on 54 intestinal biopsies (33 duodenal, 21 jejunal) from 10 children with celiac disease, 23 with acute hepatitis 6 with chronic enteritis, 7 with nonspecific mucosal damage with dystrophy, 2 with mucoviscidosis, 1 intestinal lymphangiectasis and 6 controls (including 1 adult). In controls the arithmetic mean of the average length of villi was 393 μ, of crypts 179 μ and the villus/crypt ratio was 2.298. The average length of crypts increased with increase of mucosal atrophy. Highest values were obtained in the celiac group (266-461 μ, mean 320), mucoviscidosis (230-426, mean 328 μ) and chronic enteritis (187-312, mean 260 μ). Significantly lower values in length of villi were seen in celiac disease (90 μ) and hepatitis (264 μ). A classification of pathologic alterations based on villus/crypt ratio revealed that among controls more than 50% of villus/crypt ratios were between 1.6-3.5, while in partial atrophy more than 70% and in subtotal atrophy more than 90% of ratios were less than 0.6. (this was most pronounced in celiac disease where 92.4% of the acute form had a ratio of less than 0.6). There were no statistically valid differences in the number of Paneth cells and mitotic index in the different groups, but a greater variation from the mean was more frequently seen in these groups than in controls. In the lamina propria there was a statistically significant increase of infiltrating plasma cells and decrease of lymphocytes in hepatitis and celiac disease (when compared to controls).

5926 CYTOLOGICAL ULTRASTRUCTURE OF MUCOSAL STROMA IN INTESTINAL ENTEROPATHY, ESPECIALLY IN IDIOPATHIC STEATORRHEA.

(Ger.) Otto, H. F. (U. Hamburg Pathol. Inst., Germany) and W. Martin. *Virchows Arch.* [*Pathol. Anat.*] 353(3):191-206, 1971.

Study of 33 jejunal biopsies from 22 unselected patients (idiopathic steatorrhea, Crohn's disease, Whipple's disease, secondary hyperaldosteronismus, chronic pancreatitis, Menetrier's syndrome, myelopathy, diarrhea of unknown etiology, condition after Salmonella infections) revealed the presence of consistent characteristic histomorphological changes only in cases of celiac sprue. The changes included a "flat mucosa" (subtotal atrophy of villi), dense lymphoplasmacytic infiltrations in the lamina propria (45% plasma cells, 40% lymphocytes, 6% mast cells, 5% macrophages, 4% predominantly polymorphonuclear leukocytes) and a significant increase (15.7% as compared to 7-7.5% in normals) in interepithelial "lymphoid round cells" (theliocytes). Plasma cells showed morphological signs of significant functional activation and some lymphocytes seemed to be in initial stages of transformation (immunoblasts) suggesting that immunological factors may be involved in celiac sprue. The close contact and arrangement of lymphocytes and epithelial cells in the interepithelial spaces also indicated immunological function of these cells. It is still not clear however if these cells are immuno-competent or active or if they are "memory cell" types.

5927 RENAL AND INTESTINAL MALABSORPTION OF AMINO ACIDS IN LOWE'S SYNDROME. (Ger.) Colombo, J. P. (Island Hosp., Bern, Switzerland). *Schweiz. Med. Wochenschr.* 101(26):968-972, 1971.

Amino acid determination (high voltage electrophoresis and chromatography) in stools and urine of 2 boys with Lowe's syndrome revealed increased (compared to normal) excretion of neutral amino acids (leucine, valine, alanine, threonine and tyrosine) in the stools of both and lysine and ornithine in 1 case. Hyperaminoaciduria due mainly to increased excretion of threonine, alanine, glycine, histidine and arginine existed in both cases. It was concluded that in Lowe's syndrome, in addition to defective renal reabsorption, there is also impaired transport of certain amino acids in the intestines.

5928 LACTOSE MALABSORPTION AND MILK REJECTION IN NEGRO CHILDREN. (E.) Paige, D. M. (Johns Hopkins U. Sch. Hygiene Public Health, Baltimore, Md.), T. M. Bayless, G. D. Ferry and G. G. Graham. *Johns Hopkins Med. J.* 129(3): 163-169, 1971.

A school lunchroom survey of milk consumption in both Negro and white elementary school children was conducted and lactose tolerance tests were performed. While 20% of 312 Negro children observed in each of 2 independent surveys consumed less than half of their carton of milk, only 10% of the 221 white children consumed this amount. Whereas 67% of all nonmilk drinkers drank less than 1/4 of their milk, 93% of all milk drinkers consumed more than 3/4 of their milk. Parental milk drinking history revealed that milk rejection was greatest by the mothers of the Negro nonmilk drinkers (79%) compared to 33% of the mothers of Negro milk drinkers. Approximately 60% of the white mothers in both groups consumed milk. Lactose tolerance tests were abnormal in 17% of the 12 white nonmilk drinkers and in 20% of the 15 white milk drinkers. Among the 14 Negro milk drinkers, 5 (35.7%) had abnormal tests. Of 17 Negro nonmilk drinkers, 13 (76.5%) had an abnormal rise in blood sugar, symptoms of lactose intolerance being present in 85% of these children. Thus, intolerance seems to be an important factor in milk rejection in Negroes.

5929 MALIGNANT MESENTERIC LYMPHOMA IN A PATIENT WITH DERMATITIS HERPETIFORMIS, HYPOCHLORHYDRIA, AND SMALL-BOWEL ABNORMALITIES. (E.) Andersson, H. (Sahlgren's Hosp., Goteborg, Sweden), G. Dotevall and H. Mobacken. *Scand. J. Gastroenterol.* 6(5):397-399, 1971.

A patient with long standing dermatitis herpetiformis with jejunal mucosal changes, malabsorption, gastric hypochlorhydria and mesenteric lymphoma is presented. The patient had symptoms of intestinal disease for about 25 yr before surgery for malignant mesenteric lymphoma. Four years after surgery, biopsy of the small intestinal mucosa at the duodenojejunal junction showed a subtotal atrophy similar to that seen in celiac disease. Enzyme studies of the intestinal mucosa revealed a generally low disaccharidase activity. Thus, a lymphoma occurring secondary to the enteropathy of dermatitis herpetiformis seems likely in this case. Some similarity between this enteropathy and that observed in celiac disease is suggested.

5930 AUTOANTIBODIES TO RETICULIN IN PATIENTS WITH IDIOPATHIC STEATORRHOEA, CELIAC DISEASE, AND CROHN'S DISEASE, AND THEIR RELATION TO IMMUNOGLOBULINS AND DIETARY ANTIBODIES. (E.) Alp, M. H. (Radcliffe Infirm., Oxford, England) and R. Wright. *Lancet* 2(7726):682-685, 1971.

The relationship between autoantibodies to reticulin and the clinical features, circulating immunoglobulins and dietary antibodies were examined in patients with various diseases of the gastrointestinal tract. Reticulin autoantibodies were detected in 34% of 50 patients with idiopathic steatorrhea, 54% of 71 children with celiac disease (normal children had no antibodies) and 25% of 59 patients with Crohn's disease. Autoantibodies to reticulin were shown to be more common in patients with steatorrhea and celiac disease who were on normal rather than gluten-free diets. In addition, these same patients tended to have higher titer antibodies to gluten fraction III if they had antibodies to reticulin in their serum. However, there was no difference in distribution of high-titer ovalbumin antibodies in patients with or without serum antibodies to reticulin. While no correlation was found between levels of circulating immunoglobulins and serum antibodies to reticulin, all 4 children with celiac disease accompanied with IgA deficiency had large amounts of reticulin antibodies in their serum. Six children with celiac disease were studied during gluten challenge. Five showed serum reticulin antibodies which were associated with a rise in titer of antibodies to gluten fraction III whereas dietary antibodies to ovalbumin showed little change. Reticulin antibodies may be a useful aid in diagnosis of idiopathic steatorrhea and celiac disease and in the absence of dietary antibodies, may be direct consequences of intestinal tissue damage or its perpetuation in Crohn's disease. In addition, development of the intestinal lesion in celiac disease may relate to an immunological reaction to gluten, reflected as high titer antibodies to gluten fraction III.

5931 SECONDARY DISACCHARIDE ENTEROPATHY IN CERTAIN DISEASES OF THE DIGESTIVE TRACT. (Bul.) Yanev, P. D. *Med. Probl. (Plovdiv)* 22(5-6):71-76, 1970.

5932 COLLAGENOUS SPRUE. (E.) Anonymous. *Br. Med. J.* 2(5753):65-66, 1971.

5933 PROTEIN-LOSING GASTROENTEROPATHY. (E.) Sakai, T. (U. Niigata Sch. Med., Japan), T. Muto and J. Soga. *J. Abdom. Surg.* 13(4): 74-81, 1971.

5934 DIETARY TREATMENT OF EXUDATIVE ENTEROPATHIES WITH TRIGLYCERIDES OF MEDIUM CHAIN FATTY ACIDS. (Ger.) Glaubitt, D. *Med. Welt* 22(25):1070, 1971.

5935 REVERSIBLE HYPOPROTEINEMIA, STEATORRHEA, PROTEIN-LOSING ENTEROPATHY, LOSS OF CALCIUM AND ELECTROLYTES, ATROPHY OF THE VILLI, AND DILATATION OF THE LYMPHATICS IN AN OPERATED PATIENT WITH CANCER OF THE ESOPHAGUS. (Sp.) Gaon, D. (Found. Med. Stud., Buenos Aires, Argentina), J. J. Olaciregui, P. Garcia Siguero, J. L. Martinez Seeber, M. Rapaport and M. Checkherdemian. *Rev. Esp. Enferm. Apar. Dig.* 35(1):85-94, 1971.

5936 DISACCHARIDE OVERFLOW IN THE SMALL INTESTINE. (Fr.) Mamelle, J. C. (Debrousse Pediatr. Hosp., Lyon, France). *Pediatrie* 26(2):129-160, 1971.

5937 SMALL INTESTINAL DISACCHARIDASE ACTIVITIES IN EXPERIMENTAL IRON AND PROTEIN DEFICIENCY. (E.) Sriratanaban, A. (Rhode Island Hosp., Providence, R. I.) and W. R. Thayer, Jr. *Am. J. Clin. Nutr.* 24(4): 411-415, 1971.

5938 JEJUNAL DISACCHARIDASE ACTIVITIES IN CHILDREN WITH MARASMUS AND WITH KWASHIORKOR. RESPONSE TO TREATMENT. (E.) James, W. P. T. (Univ. West Indies Trop. Metabol. Res. Unit, Mona, Jamaica). *Arch. Dis. Child.* 46(246):218-220, 1971.

5939 SIGNIFICANCE OF INTESTINAL BIOPSY IN THE DIAGNOSIS OF MALABSORPTION SYNDROME IN CHILDREN. (Sl.) Prekop, R. (P. J. Safarika U. Med. Sch., Kosice, Czechoslovakia), P. Bilcik and E. Matheova. *Lek. Obzor* 20(2):83-91, 1971.

5940 SENSITIZATION TO COW'S MILK. (Pol.) Zalewski, T. (Med. Acad. Clin. Pediatr. Dis., Warsaw, Poland), H. Foltanska and E. Pulwarska. *Pediatr. Pol.* 46(2):159-164, 1971.

5941 ACRODERMATITIS ENTEROPATHICA. (Pol.) Papuzinski, M. (Stolecznego Hosp. Dermatol., Warsaw, Poland) and T. Zalewski. *Pediatr. Pol.* 46(2):145-157, 1971.

5942 ASSESSMENT OF INTESTINAL ABSORPTION BY XYLOSE TEST IN DIABETIC ENTEROPATHY. (Pol.) Taton, J. (Med. Acad 3rd Clin. Intern. Dis., Warsaw, Poland), A. Wisniewska and M. Dratwa. *Pol. Arch. Med. Wewn.* 46(2):205-212, 1971.

See also numbers: 5435, 5640, 5641, 5915, 5942, 6260

5943 ACTINOMYCOSIS OF THE TRANSVERSE MESOCOLON. (E.) Miller, R. E. (St. Luke's Hosp., New York, N. Y.) and S. Katz. *Am. J. Surg.* 122(3):414-416, 1971.

A report of a rare entity, primary abdominal actinomycosis, usually found secondary to an acute perforative gastrointestinal disease, is presented. A postoperative barium enema revealed a 3 cm extrinsic filling defect at the transverse colon with preservation of the mucosal pattern in the area. Following transverse colectomy, the actinomycotic abscess was found to be localized in the transverse mesocolon and did not appear to involve the adjacent colon. Pathologic examination of the specimen revealed an abscess containing p-aminosalicylic acid, gram-positive mycelial structures and neutrophils. Because of the localized nature of the actinomycotic process, long-term antibiotic therapy was withheld. In this unusual form of abdominal actinomycosis either the mucosal break had healed or the organism was virulent enough to penetrate the normal intact mucous membrane.

5944 SURGICAL TREATMENT OF TOXIC MEGACOLON. ILEOSTOMY AND COLOSTOMY TO PREPARE PATIENTS FOR COLECTOMY. (E.) Turnbull, R. B., Jr. (Cleveland Clin. Found., Ohio), W. A. Hawk and F. L. Weakley. *Am. J. Surg.* 122(3):325-331, 1971.

Of 1,181 patients with nonspecific inflammatory disease of the colon seen between 1961 and 1971, 74 patients had toxic megacolon. Forty-two of these patients underwent emergency ileostomy-colostomy instead of colectomy because of sealed-off perforations of the colon and the possibility of trauma (surgical handling)-induced disruption or perforation and subsequent fecal spillage. Only 1 of 42 patients died postoperatively from diffuse necrotizing vasculitis. In these patients the pathologic changes of acute toxic megacolon were superimposed on the basic underlying chronic colonic disease. The inflammatory process (extensive mucosal ulceration, transmural inflammation) was fulminant and affected all layers of the colon, often obscuring the hallmarks of the antecedent ulcerative colitis. Of the 42 patients receiving ileostomy and cutaneous transverse colostomy, only 4 continued to have toxic colitis although the colon in each was thoroughly decompressed. These plus an additional 8 patients underwent subsequent successful colectomy. When performing a colectomy following an ileostomy-colostomy, the sites of colonic perforation in the left gutter and at the site of the transverse colostomy must be drained for as long as 21 days to avoid late postoperative abscess formation. The expected operative mortality in 42 patients with perforative toxic ulcerative colitis was markedly reduced with the ileostomy-colostomy operation.

5945 ASEPTIC SINGLE LAYER ANASTOMOSIS OF THE BOWEL. A REVIEW OF ONE HUNDRED SEVENTY-FIVE CASES. (E.) Peters, H. E., Jr. (400 29th St., Oakland, Calif.) and A. Stanten. *Am. J. Surg.* 122(2):159-163, 1971.

Aseptic single layer anastomosis was performed in 175 patients undergoing intestinal resection, including 38 small intestine resections and 137 colon resections. There were 14 deaths (8.6%) in the series including 4 due to carcinomatosis, 2 with liver failure, and 2 with pulmonary embolus with none being associated with anastomotic leaks. The wound infection rate was 18% in small intestine resections and 14% in colectomies (15.4% overall). Ninety six patients (70%) who underwent colectomy had an uncomplicated postoperative course. Although there was no clinical evidence of anastomotic leak in the patients undergoing small intestine resection, there were 4 such incidences in colectomy patients. Of these, 3 healed spontaneously and the fourth healed following intraperitoneal drainage.

5946 THE COLON IN KWASHIORKOR. (E.) Redmond, A. O. B. (U. Cape Town Dept. Pediatr., South Africa), R. O. C. Kaschula, C. Freeseman and J. D. L. Hansen. *Arch. Dis. Child.* 46(248):470-473, 1971.

The colon of 20 children with kwashiorkor was investigated by rectal biopsy and sigmoidoscopy followed by barium enema in 10 of the children. The striking sigmoidoscopic finding after admission was the increased vascularity of the mucosa and the impression of hypotonicity and laxity of the intestine wall. During the acute stage of the disease, the rectal mucosa showed features of mild atrophy. The surface epithelial cells were flattened, mucus storage was reduced and a polymorphonuclear leukocyte infiltrate was seen among these cells. Congestion and edema of the lamina propria were sometimes striking features producing separation of the crypts. Barium enema did not reveal any abnormality in the mucosa and there was no delay in evacuation. The surface epithelial atrophy, inflammatory infiltration and vascular reaction are similar to the features of untreated celiac disease and mild ulcerative colitis. These problems were all resolved upon recovery from kwashiorkor.

5947 PAPILLARY ADENOMAS (VILLOUS TUMORS): A REVIEW OF 215 CASES. (E.) Quan, S. H. Q. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.) and E. B. Castro. *Dis. Colon Rectum* 14(4):267-280, 1971.

A 13-yr survey of 215 patients treated for papillary adenomas of the large intestine revealed a high incidence (58.6%) of carcinomatous changes. Almost 90% of the tumors were sessile, the states of sessileness and pedunculation not correlating with the presence or absence of malignancy change. Qualities of fragility, annularity, ulceration, size, and particularly induration, were all characteristics of progression into a carcinomatous transformation. Of 215 patients, 91.9% had tumors located in the rectum, rectosigmoid, and sigmoid colon. The frequency of multiple primary cancers (13.9%) and the incidence of other carcinomas (12%) in these patients with papillary adenoma may be a common genetic trait. The overall incidence of recurrence was 12%. That papillary adenoma on the whole is relatively benign with a favorable prognosis was reflected in the 10-yr overall and determinate survival rates of 52 and 92%, resp. Apparently benign and/or atypical lesions do not have a strong propensity to become malignant, as this only occurred in 2 patients. The treatment for papillary adenoma should be selective.

5948 SURVIVAL AFTER OPERATIONS FOR RECTAL CARCINOMA IN PATIENTS OVER 70 YEARS OF AGE. (E.) Block, G. E. (U. Chicago Hosps., Ill.) and W. E. Enker. *Ann. Surg.* 174(3):521-529, 1971.

The results of definitive operative treatment of patients over 70 yr old with carcinoma of the rectum or rectosigmoid were reviewed. The total postoperative mortality rate (up to 60 days after surgery) was 15.2% (10 patients): 7 deaths (17.1%) occurring in the group of 41 patients undergoing anterior resection, and 3 of 23 patients (13%) after abdominoperineal resection. The absolute survival for all patients who underwent definitive operation for carcinoma of the rectum or rectosigmoid was 56.6% at 5 yr following operation. The survival rate at 5 yr for anterior resection was 59.3% and for abdominoperineal section it was 52.2%. Local electrocoagulation was effective in increasing survival. In this population, patients did better after definitive resection than after local treatment, and with the former treatment the results approached the survival in populations of all ages.

5949 ELEMENTAL DIET IN THE MANAGEMENT OF THE INTESTINAL LESION PRODUCED BY 5-FLUOROURACIL IN MAN. (E.) Bounous, G. (Univ. Hosp. Ctr., Sherbrooke, Quebec, Canada), J. M. Gentile and J. Hugon. *Can. J. Surg.* 14(5):312-324, 1971.

The effects of an elemental diet (Mead Johnson product 3200-A.S.) on the large intestines of 21 cancer patients receiving 5-fluorouracil (5-FU) with or without simultaneous radiation were studied. At the end of 5-FU treatment (6-9 days), the average weight loss of control patients was 2.77 kg whereas patients on the elemental diet maintained their weight during therapy. Total calorie intake was approximately equal in the 2 groups, however, when caloric intake was expressed per kg body weight, controls took 20.4 kcal/kg and diet patients 27.1 kcal/kg. Serum LDH, alkaline phosphatase, bilirubin, cholesterol, glucose and protein were not statistically different in the 2 groups. Rectal biopsies revealed that the epithelial cells were better preserved in the diet group, having more mucin, less vacuoles, dense cytoplasm and taller cells. The mean height of the surface rectal epithelium was 42.1 μ in the control group and 58.1 μ in the diet group.

5950 ANASTOMOTIC RECURRENCES AND FIVE-YEAR SURVIVAL RATE AFTER LOW ANTERIOR RESECTION FOR CURE IN 128 PATIENTS WITH RECTAL CANCER. (E.) Andersen, B. (Bispebjerg Hosp., Copenhagen), T. Clemmesen, M. Sprechler and H. Baden. *Scand. J. Gastroenterol.* 6(5):449-451, 1971.

The frequency of suture line recurrences and the 5-yr survival rates of low anterior resection for cure of rectal cancer were studied in 128 patients. Most resections were performed 5-10 cm below the tumor and preoperative intestinal asepsis was routine. The risk of suture line recurrences in low anterior resections for cure was 3.1% (3 patients) with 95% confidence limits of 0.8-8.3%. There were no anastomotic recurrences in the 28 palliative resections. While the crude 5-yr survival rate in the resections for cure was 66.5%, the relative rate (adjusted for noncancer deaths) was 78.7%. The crude 5-yr survival rate in the patients receiving palliative resections was 6.3%.

5951 LOOP COLOSTOMY - BAR VERSUS ROD. (E.) Greene, H. G. (Albert Einstein Coll. Med., Bronx, N. Y.). *Dis. Colon Rectum* 14(4): 308-309, 1971.

A flat plastic bar was inserted into 10 patients undergoing loop colostomy to allow the immediate application of a colostomy bag at the time of surgical operation and to make diversion of the fecal stream more effective. The bar was inserted on edge into a 1½ inch long radial slit in the peripheral mesocolon and rotated 90 degrees so that it lay flat on the skin. In no case was there irritation of the skin, intestine abrasion, problem with colostomy bag fit or slippage of intestine from its original position. The colostomy frequently functioned on the first postoperative day, and although fecal diversion was difficult to quantitate, the bar seemed to accomplish this more efficiently than a rod.

5952 FACTITIAL PROCTITIS: A RESTUDY AT THE UNIVERSITY OF MINNESOTA. (E.) Sherman, L. F. (U. Minnesota Sch. Med., Minneapolis), K. A. Prem and N. M. Mensheha. *Dis. Colon Rectum* 14(4):281-285, 1971.

The records of 355 patients irradiated for pelvic malignancies during a 6-yr period at the

University of Minnesota Hospitals were reviewed. Of these patients 275 had carcinoma of the cervix and 80 had other pelvic malignancies. The combined total dosages to tissue on the anterior rectal wall in periods of approximately 5 weeks varied from 6,300 to 9.850 rads. Of 148 patients followed for 2-5 yr, factitial proctitis occurred in 38 (a decrease of 10% over 1958 figures) with 21 (14.2%) having grade I lesions, 13 (8.8%) with grade II lesions and 4 (2.7%) with grade III lesions. Of 12 patients treated with a retention enema of 100 mg hydrocortisone in 60 ml of physiologic saline solution with 1% methyl cellulose, 91% were healed or improved within 8 weeks after beginning treatment. Of 12 patients treated with the same retention enema as above but without hydrocortisone, 83% showed no improvement or worsened in the 3-6 month period following the beginning of treatment, however, they improved when switched to the former enema. Treatment with the enema was found to be superior to the topical application of steroid in suppositories, the average duration of treatment being 2-3 months.

5953 CALCIFICATION AND OSSIFICATION IN JUVENILE POLYPS OF THE COLON. (Ger.) Hański, W. (Radom City Hosp., Poland). *Zentralbl. Allg. Pathol.* 114(2):245-250, 1971.

Results of histomorphological studies of 8 polyps of the colon (3 with calcification, 5 with ossification) in children are described in detail and the ossification potential discussed. It is concluded that they are not the result of metaplastic, but rather of heteroplastic processes, i.e. ossification originating from defective primary differentiation. It is suggested that the histological characteristics indicate hamartomas.

5954 ELECTROCOAGULATION IN THE TREATMENT OF CANCER OF THE RECTUM. A CONTINUING STUDY. (E.) Madden, J. L. (St. Clare's Hosp., New York, N. Y.) and S. Kandalaft. *Ann. Surg.* 174(3):530-540, 1971.

The use of electrocoagulation in the treatment of cancer of the rectum was evaluated in 77 patients with rectal cancer and compared with treatment by abdominoperineal resection. Overall follow-up of both operable and inoperable patients revealed 54.5% alive and well for an average duration of 4 yr, 5.2% alive with disease after an average of 2.6 yr, 20.8% dead of disease after 2 yr, and 19.5% dead of other causes after 2.6 yr (disease present in 3). In the operable group, 71.1% were alive and well for an average duration of 4 yr with 3 having subsequent abdominoperineal resections performed. In the inoperable group, 20% were alive and well for an average duration of 49 months, and 5 of the 8 patients who died of other causes had no disease present. In the total of 77 patients, 27 were classified as failures (35.2%); 23.1% and 60.0% in the operable and inoperable groups, resp. Considering complications and the patient population, electrocoagulation seems comparable to and in some ways better than abdominoperineal resections.

5955 INTERFLEXURAL CARCINOMA OF THE COLON: CLINICAL - RADIOLOGIC - PATHOLOGIC CORRELATIONS. (E.) Messinger, N. H. (Montefiore Hosp., Bronx, N. Y.), T. C. Beneventano and S. S. Siegelman. *Dis. Colon Rectum* 14(4):255-258, 1971.

The radiographic featuees of primary interflexural carcinoma were correlated with the clinical presentation and the surgical pathology of the neoplasm in 46 patients with tumors between the hepatic and splenic flexures. Symptoms indicating obstruction were reported by 27 patients (59%), the other patients presenting with rectal bleeding (6), abnormal chest x-rays (metastasis) (4), palpable mass (3) or weight loss (3). The lesions were confined to the colonic musculature in 27 patients and had extended to the serosa or beyond in 19 patients. Of 21 patients whose barium studies showed areas of the lumen of the intestine in which the diameter was 6 mm or less, 17 reported colicky abdominal pain or a change in intestinal habits, with 8 of these tumors being confined to the intestinal wall. Among the 12 patients with lumina 6-10 mm in diameter, 5 had tumors that extended beyond the serosa and each was associated with abdominal pain or constipation. Only 2 had symptoms of obstruction. Three of the 13 patients with lumen diameters of 10 mm or more had clinically evident obstruction, and in all 3 the lesions were not confined to the colonic musculature.

5956 MALACOPLAKIA OF THE COLON. (E.) Di Silvio, T. V. (Jefferson Med. Coll., Philadelphia, Pa.) and E. F. Bartlett. *Arch. Pathol.* 92(3):167-171, 1971.

A case of malacoplakia of the colon is presented which represents the first histologically documented example of temporary regression of the lesion, accompanied by long-term, although temporary clinical improvement. In this 18-yr-old male patient, barium enema revealed numerous polypoid filling defects of the entire descending colon. Linear fissures between the polypoid defects were present and a rectal biopsy revealed malacoplakia with distortion and separation of the lamina propria by a massive cellular infiltrate characterized by large histiocytes, scattered plasma cells, lymphocytes, and occasional eosinophils. Following initial therapy of a low residue diet and salicylazosulfapyridine, a second biopsy revealed similar but less prominent changes. This biopsy also contained a considerable thickness of submucosa, where there was some fibroblastic activity and collagen formation. Further treatment with antibiotics and a 30-day fast accompanied by i.v. hyperalimentation was reflected by a still abnormal intestine but one upon which the diagnosis of malacoplakia could not objectively be made. Histologic lessening of the histiocytic infiltrative process parallels the gradual improvement of the patient's clinical condition and the temporary disappearance of the lesions by sigmoidoscopy and x-ray.

5957 MOTILITY OF THE SIGMOID COLON AND RECTUM: CONTRIBUTION TO THE PHYSIOPATHOLOGY OF MEGACOLON IN CHAGAS' DISEASE. (E.) Habr Gama, A. (U. Sao Paulo Sch. Med., Brazil), A. Raia and A. Correa Netto. *Dis. Colon Rectum* 14(4):291-304, 1971.

The motility of the distal large intestine was compared in 25 patients with megacolon and a positive Machado Guerreiro test, 15 of these studied 2.5-3.5 yr after surgical treatment of the megacolon and 15 normal controls. Intraluminal pressure changes in normal subjects showed little activity, consisting mainly of simple waves of low amplitude and short duration with no coordination of sigmoidal and rectal activity. The pre- and postoperative chagasic megacolons showed hyperactivity, numerous high amplitude, long duration complex waves and synchronous activity between the colon and rectum. Whereas, methacholine chloride 0.05 mg/kg body weight i.m.) had no effect on the motor activity of the sigmoid colon and rectum of normal subjects, patients with chagasic megacolon showed increased motor activity in both segments before and after surgery. Colonic motor abnormalities in patients' megacolon of Chaga's disease seem to result from ganglionic cell lesions of the intestinal myenteric plexus.

5958 SUPERFICIAL MUCOSAL ULCERATION AND THE PATHOGENESIS OF ACUTE APPENDICITIS. (E.) Sisson, R. G. (Washington U. Sch. Med., St. Louis, Mo.), R. C. Ahlvin and M. C. Harlow. *Am. J. Surg.* 122(3):378-380, 1971.

Of 64 appendixes removed at surgery over a period of 1 yr, well-defined superficial mucosal ulcers were found microscopically in 48 of the specimens. This occurred without dilatation in 28. The preoperative duration of clinical illness in the above situation was from 6 to 30 hr (mode; 12 hr). Dilatation of the appendix occurred in 16 cases, the duration of the illness ranging from 6 to 72 hr (mode 24 hr). The duration of illness in the above 2 groups was significantly different. Superficial mucosal ulceration was the most constant anatomic feature and tended to occur earlier than did dilatation. Dilatation was more likely to occur when the inflammatory process in the appendix wall was advanced and ulcers were often no longer demonstrable. The presence of superficial mucosal ulcers as the early morphologic change in acute appendicitis concurs with the increasing accumulation of evidence that a viral infection may be the etiologic agent in this disease.

5959 THE POSSIBLE RELATIONSHIP OF APPENDICITIS WITH PERFORATION IN CHILDHOOD TO INFERTILITY IN WOMEN. (E.) Thompson, W. M. (Mayo Clin., Rochester, Minn.) and H. B. Lynn. *J. Pediatr. Surg.* 6(4):458-461, 1971.

The records of all girls under 20 yr of age who had an appendectomy for acute appendicitis at the Mayo Clinic between 1940 and 1949, and were residents of Olmstead County, were reviewed to see if there was a relationship between appendicitis with perforation in childhood and infertility in women. In the 10-yr period there were 37 such girls and of these 29 reported that they were married and had children, 6 were married without children and 2 were single. All 6 of these patients without children had undergone infertility investigations. Of the 8 patients who had not conceived, 3 had fecaliths while only 7 of the other 29 had fecaliths. The control group for the 10-yr period included 193 girls (181 of whom were followed-up) of whom 166 were married with children, 9 were single, and 6 were married without children. It was concluded that infertility may be a potential sequela of perforated appendix in girls.

5960 CIVILIAN COLONIC INJURIES AND CURRENT SURGICAL MANAGEMENT. (E.) Marks, C. (Case Western Reserve U. Sch. Med., Cleveland, Ohio) and M. R. Ramachandra Rao. *Dis. Colon Rectum* 14(5):347-352, 1971.

5961 SIGMOIDMYOTOMY IN DIVERTICULAR DISEASE OF THE COLON. (E.) Dick, E. T. (Hamilton, New Zealand). *Dis. Colon Rectum* 14(5):341-346, 1971.

5962 THROMBOSED HEMORRHOIDS: A CLINICOPATHOLOGIC STUDY. (E.) Ganchrow, M. I., H. E. Bowman (Ferguson Clin., Grand Rapids, Mich.) and J. F. Clark. *Dis. Colon Rectum.* 14(5):331-340, 1971.

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6014 INFECTIOUS ENTEROCOLITIS. CLINICAL AND BACTERIOLOGICAL RELIEF IN SUBJECTS TREATED WITH A SULFONAMIDE-ANTIBIOTIC-ANTISPASTIC ASSOCIATION. (It.) Restivo, O. (Garibaldi Hosp., Catania, Italy), G. Sindoni, S. Ballati and V. Foti. *Gazz. Med. Ital.* 130(1):1-15, 1971.

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6016 DUPLICATION OF THE COLON. (Ser.) Kucisec, A. (Milit. Hosp., Zagreb, Yugoslavia) and N. Rudan. *Lijecn. Vjesn.* 92(10): 1167-1173, 1970.

6017 VOLVULUS OF THE SIGMOID COLON. (E.) Agrawal, R. L. (Banaras Hindu U. Coll. Med. Sci., Varanasi, India) and M. K. Misra. *Int. Surg.* 55(1):49-56, 1971.

See also numbers: 5642, 5643, 5644, 5683, 5684, 5685, 5686, 5687, 5688, 5689, 5864, 5889

ULCERATIVE COLITIS

6018 ULCERATIVE COLITIS IN FINLAND: I. CASES TREATED AT CENTRAL HOSPITALS, 1956-1967. (E.) Möller, C. (Univ. Hosp., Helsinki) and G. Lindén. *Dis. Colon Rectum* 14(4):259-263, 1971.

The records of 505 Finnish patients with ulcerative colitis diagnosed between 1956 and 1967 at central hospitals were reviewed. The chief clinical symptom was bloody diarrhea, and more than half of the patients had metabolic disturbances. The severity of the clinical course correlated well with the topographic extent of the disease, the patients' condition being least often affected in cases of left-sided colitis. The most common systemic complications were arthritis and diseases of the liver. Associated disease was observed in 132 patients, most often unrelated gastrointestinal complaints, endocrine disturbances and psychological aberrations. The mortality was 6.3% (32 patients) due to ulcerative colitis. An even distribution of cases was observed between the sexes with a slight male predominance. The average incidence of ulcerative colitis was 0.93/100,000 inhabitants/yr; however a clear upward trend was observed. The incidence per 100,000 inhabitants was higher for rural than for urban areas.

6019 ULCERATIVE COLITIS IN FINLAND: II. ONE-YEAR INCIDENCE IN ALL HOSPITALS. (E.) Lindén, G. (Univ. Hosp., Helsinki) and C. Möller. *Dis. Colon Rectum* 14(4):264-266, 1971.

The overall incidence of ulcerative colitis among patients admitted to hospitals in Finland in 1967 was determined. The incidence of this disease was 4.8/100,000 inhabitants. No predominance of women among patients with ulcerative colitis was observed. The incidence was highest between the third and sixth decades of life, however the incidence among persons over the age of 70 was considerable. The urban population had a somewhat higher incidence than the rural population (5.04 versus 4.51/100,000 inhabitants). The incidence was highest (5.8/100,000) in cities with populations of more than 100,000.

6020 NATURAL HISTORY OF REGIONAL ENTEROCOLITIS. (E.) Willwerth, B., J. J. DeCosse, H. J. Dworken (Univ. Hosps., Cleveland, Ohio), D. B. McKillop and F. Vellios. *Arch. Surg.* 103(2):315-320, 1971.

Clinical manifestations were correlated with the anatomic location of diseased intestine, pathological findings, and clinical course in 105 hospitalized patients with regional enterocolitis. Of all patients treated medically and observed, 91% had recurrence, whereas only 65% of surgically treated patients had recurrence of symptoms. Colon involvement enhanced the probability of recurrent symptoms. Patients with colon involvement presented at a younger age, were more often females, and had a gradual worsening of symptoms and a more low-grade protracted course than patients without colon involvement. The term regional enterocolitis may actually represent a spectrum of diseases of different etiology and pathogenesis.

6021 AZATHIOPRINE TREATMENT OF ULCERATIVE COLITIS, GRANULOMATOUS COLITIS AND REGIONAL ENTERITIS. (E.) Patterson, J. F. (New England Med. Ctr. Hosps., Boston, Mass.), R. A. Norton and R. S. Schwartz. *Am. J. Dig. Dis.* 16(4):327-332, 1971.

The effectiveness of azathioprine (starting dose 2.5 mg/kg body weight/day) in the treatment of ulcerative colitis, granulomatous colitis, or regional enteritis was studied in 24 patients treated for variable periods of time. Of the 17 patients that received azathioprine for 4 months or longer, 11 experienced a long remission, 3 improved partially or temporarily, and 3 failed to improve. Withdrawal of corticosteroids was possible in all 14 patients in whom azathioprine was effective. In 7 patients, the therapy was given for less than 4 months for various reasons. In no instances in this series was it necessary to abandon azathioprine treatment because of myelotoxicity; however, adjustment of dosage was often necessary because of minor degrees of leukopenia. Side effects of azathioprine included transient leukopenia in 5 patients, fever and rash in 2, and persistent nausea and partial hair loss in 1; however, all side effects were easily reversible. Thus, azathioprine seems to be effective in the treatment of inflammatory intestinal disease in patients in whom standard therapy cannot be used.

6022 CHRONIC ULCERATIVE COLITIS BEGINNING IN CHILDREN AND TEENAGERS. A REVIEW OF 43 PATIENTS. (E.) Patterson, M. (U. Texas Med. Branch, Galveston), L. Castiglioni and L. Sampson. *Am. J. Dig. Dis.* 16(4):289-297, 1971.

The records of 43 patients with chronic ulcerative colitis which began in childhood and teenage years (1953 to 1966) were reviewed to assess the impact of this illness on the lives of these patients. When first seen 5% had involvement of the rectum or rectosigmoid, 22% had left colon involvement, 48% had total colon involvement, 23% had involvement of the entire colon and terminal ileum, and 2% had segmental lesions. At this time 65% (28) had complications of their disease, and multiple complications were frequently observed. Of 42 patients followed-up, 6 (14%) died, all before the age of 30. Ten colectomies and 1 ileorectal anastomosis were performed while 27 patients followed-up were treated medically. At the time of this study, 9 surgical patients are still alive and only 15 medical patients remained relatively symptom-free. There was no apparent relationship between age of onset and present status. However, total colon involvement and continuous symptoms forecast a poor prognosis.

6023 CARCINOMA ASSOCIATED WITH MUCOSAL ULCERATIVE COLITIS, AND WITH TRANSMURAL COLITIS AND ENTERITIS (CROHN'S DISEASE). (E.) Farmer, R. G. (Cleveland Clin. Found., Ohio), W. A. Hawk and R. B. Turnbull, Jr. *Cancer Res.* 28(2):289-292, 1971.

The relationship of inflammatory disease of the colon to malignancy was studied in 1124 patients with transmucosal enteritis and colitis and mucosal ulcerative colitis. Thirty-seven of 613 patients with mucosal ulcerative colitis had carcinoma of the colon. Thirty-six of these patients had ulcerative colitis affecting the entire colon. The mean duration of ulcerative colitis before diagnosis of carcinoma was 18 yr. The mean age prior to diagnosis was 40 yr. Of the 37 patients, 36 were symptomatic from the ulcerative colitis which made diagnosis of carcinoma more difficult. Proctosigmoidoscopy procedure led to the diagnosis of carcinoma in 14 of 37 patients. Surgery performed because of chronic active colon disease revealed malignancies in 11 patients. Single, discrete malignancies were present in 26 patients while 8 had multiple carcinomas. The remaining 3 comprised diffuse multicentric carcinomas of the colon. Two of 466 patients with transmural enteritis of the ileum were found to have malignancies. Symptoms were referable to low grade incomplete obstruction of the small intestine and malignancies were not suspected in either case prior to surgical treatment for the intestinal obstruction. Carcinoma of the colon occurred in 1 patient with transmural colitis and the malignancy occurred prior to diagnosis of the colonic disease. The mucosal type of ulcerative colitis seems to be the type of colon disease associated with a high incidence of cancer and colectomy should be considered as early as 10 yr after the onset of the ulcerative colitis.

6024 PYODERMA GANGRENOSUM: UNCOMMON COMPLICATION OF CHRONIC ULCERATIVE COLITIS. (E.) Goussous, H. G. (VA Hosp., Albany, N. Y.) and T. I. Tyrrell. *J. Abdom. Surg.* 13(8):163-166, 1971.

A 24-yr-old female was admitted with a painful leg ulcer of 2 week's duration. At the age of 11 yr she began to have abdominal cramps and by 18 she frequently had blood and mucus in the stools. At the age of 20 a barium enema was diagnostic of ulcerative colitis and at that time she noticed red spots (2-3 cm in diameter) on her neck and upper chest which were diagnosed as erythema nodosum. These lesions enlarged, disappeared and reappeared elsewhere, but never ulcerated. Her intestinal symptoms improved markedly on a low-residue diet without the use of steroids. Two weeks prior to the present admission she developed a red spot, similar to the earlier ones, on the anteromedial aspect of the left leg which developed a black center and ulcerated just before admission. This was diagnosed as pyoderma gangrenosum. Sigmoidoscopy revealed chronic ulcerative colitis of the rectum and the barium enema was characteristic. Continuous soaks of 0.5% silver nitrate led to some improvement and on the 20th hospital day she underwent proctocolectomy and permanent ileostomy, with evidence of the process beginning abruptly at the ileocecal valve. Her postoperative course was unremarkable with rapid healing of the ulcer.

6025 ULCERATIVE COLITIS. MYSTERIOUS, MULTIPLEX AND MENACING. (E.) Kirsner, J. B. (U. Chicago Dept. Med., Ill.). *J. Chronic Dis.* 23(10-11):681-684, 1971.

6026 PORTAL VEIN THROMBOSIS IN ULCERATIVE COLITIS. (E.) Aronson, A. R. (New York U. Sch. Med., N. Y.) and F. U. Steinheber. *NY State J. Med.* 17(19):2310-2311, 1971.

6027 ULCERATIVE COLITIS IN CHILDREN. (E.) Llewellyn, D. M. (Roy. Alexandra Hosp. Child., Camperdown, Australia). *Bull. Postgrad. Comm. Med. Univ. Sydney* 26(10):176-179, 1971.

6028 COLITIS, GRANULOMATOUS OR ULCERATIVE. (E.) Shallenberger, P. L. (Robert Packer Hosp., Sayre, Pa.), D. R. Weaver and G. Eisinger. *J. Abdom. Surg.* 13(4):70-72, 1971.

6029 HYPERPLASTIC ULCERATIVE GINGIVITIS AND ULCERATIVE COLITIS IN ONE MONOZYGOTIC TWIN. (Hun.) Schuler, D. (Semmelweis Med. U., Budapest), A. Gorgenyi and L. Sugar. *Orv. Hetil.* 112(10):570-572, 1971.

6030 TREATMENT OF ULCERATIVE COLITIS WITH AZATHIOPRINE. (Ger.) Kettner, W. (Dist. Hosp., Cottbus, Germany). *Dtsch. Gesundheitsw.* 26(22):1001-1004, 1971.

6031 AGGRESSIVE TREATMENT OF NEONATAL NECROTIZING ENTEROCOLITIS: 38 PATIENTS WITH 25 SURVIVORS. (E.) Stevenson, J. K. (U. Washington Sch. Med., Seattle), T. K. Oliver, Jr. and C. B. Graham. *J. Pediatr. Surg.* 6(1):28-35, 1971.

See also number: 5863

6032 INTRARENAL PANCREATIC DISEASE. (E.)

Stept, L. A. (Western Pennsylvania Hosp., Pittsburgh), S. H. Johnson, III, M. Marshall, Jr. and S. E. Price, Jr. *J. Urol.* 106(1):15-18, 1971.

A case of intrarenal pancreatic pseudocyst is presented. An excretory urogram showed a mass at the upper pole of the left kidney with associated caliceal distortion. An aortogram with bilateral selective renal arteriography revealed a large mass at the upper pole of the left kidney with stretching and distortion of the arteries in this area. Left renal exploration was performed through a transverse abdominal incision and a large mass involving the kidney, the tail of the pancreas, adrenal gland and spleen was seen. Frozen section revealed adenocarcinoma of the kidney and a radical left nephrectomy, left adrenalectomy, resection of the tail of the pancreas, splenectomy and partial excision of the left retroperitoneum was done. Final diagnosis was pancreatic cyst secondary to acute and chronic pancreatitis with erosion to the left kidney.

6033 SALMONID VIRUSES: INFECTIOUS PANCREATIC NECROSIS VIRUS. MORPHOLOGY, PATHOLOGY, AND SEROLOGY OF FIRST EUROPEAN ISOLATIONS. (E.)

Wolf, K. (Eastern Fish Disease Lab., Kearneysville, W. Va.) and M. C. Quimby. *Arch. Gesamte Virusforsch.* 34(2):144-156, 1971.

Among young trout fry in France there were some fish with symptoms and behavior suggestive of infectious pancreatic necrosis (IPN). The isolated viruses were highly labile to a single cycle of freezing at -20C. and thawing, retained their infectivity when stored under slightly acid conditions, were serologically quite unlike VR299 strain IPN virus but on electron microscopy had the size, shape and cellular location typical of IPN virus. Microscopic examination of typical fish showed them to have a pathology indicative of IPN. It is concluded that this virus isolated from the trout are really IPN viruses. However, they are antigenetically distinctive and in addition have an unusual lability to freezing and thawing, and especially to storage in unmodified culture medium at 4C. Electromicrographs, tabular and graphic data are presented.

6034 THE EFFECT OF ORAL TRYPSIN INHIBITOR ON PANCREATIC DAMAGE IN THE RAT. (E.)

Pirola, R. C. (Roy. Free Hosp., London), I. P. Beswick and I. A. D. Bouchier. *Br. J. Exp. Pathol.* 52(3):244-251, 1971.

Soybean trypsin inhibitor was fed to rats both before and after the production of pancreatic necrosis by oral d,l-ethionine and before the induction of pancreatitis by ligation of the pancreatico-biliary duct. Soybean trypsin inhibitor, alone, produced pancreatic enlargement d-l-ethionine, alone, caused reduced pancreatic weights, reduced specific activity of pancreatic amylase, reduced pancreatic protein concentrations and raised pancreatic leucine naphthylamidase levels. Generally there was no difference between the severity of pancreatic damage in rats fed trypsin inhibitor and in those on d-l-ethionine diets. An exception was in rats given d,l-ethionine after treatment with soybean trypsin inhibitor. Their pancreas showed less destruction of exocrine tissue. Necrosis was patchy, some necrotic debris was still present and there was some edema and inflammation. There was no convincing evidence in this study that p.o. administered trypsin inhibitors influence the course of experimentally induced pancreatic injury.

6035 PROTEINS IN HUMAN DUODENAL SECRETION DURING PANCREATIC STIMULATION. (Ger.)

Gülzow, M. (Univ. Med. Clin., Rostock, Germany), D. Curschmann, K. Diwok and R. Zastrow. *Dtsch. Z. Verdau. Stoffwechselkr.* 30(3):165-176, 1970.

Protein concentration and enzymatic activity (proteinases, amylase, lipolytic activity) in the duodenal fluid from 115 patients with chronic pancreatitis was compared to that of 113 controls before and after (2 hr period) pancreatic stimulation with methacholine (15 mg s.c.) or pancreozymin (90 U i.v.) alone or followed by secretin (75 U i.v.). Immediate addition of proteinase inhibitors or precipitation of the protein with trichloracetic acid was mandatory in order to prevent loss (up to 35%) of protein concentration in the duodenal fractions during the 2 hr period. A statistically significant correlation existed in both groups of test subjects between protein concentration and enzymatic activity (especially proteolytic enzymes). After pancreatic stimulation the protein concentration in patients with chronic pancreatitis rose to a significantly lesser degree (from 0.41 ± 0.35 to 72 ± 0.55 g/100 ml) than in healthy subjects (from 0.45 ± 0.24 to 1.10 ± 0.60 g/100 ml) after methacholine. Stimulation with pancreozymin and secretin gave the same results as stimulation with methacholine and secretin. In approximately 1/4 to 1/3 of subjects the behavior of proteins and enzyme activities differed; this occurred more frequently in those with disturbances in enzyme secretion. It was concluded that determination of protein concentration in the first duodenal fluid fractions after pancreatic stimulation can be used as a screening test for evaluation of the excretory function of the pancreas. An increase in protein concentrations of 0.5 g/100 ml within the first 20 min after stimulation with 15 mg methacholine s.c. or 90 U pancreozymin i.v. indicates normal function. In these cases additional stimulation with secretin does not change the results. In the absence of a significant increase in protein concentrations a secretion test with double stimulation with secretin and pancreozymin is necessary for clarification of the secretory disturbance.

6036 REFLUX PANCREATOGRAPHY. EXPERIMENTAL OBSERVATIONS IN THE CAT. (E.) Rosenbaum, H. D. (U. Kentucky Med. Ctr., Lexington), E. G. Barker, Jr., D. E. Gibson and W. O. Griffen, Jr. *Invest. Radiol.* 6(5):321-325, 1971.

A method of reflux filling of the cat's pancreatic and biliary ducts from the isolated duodenal loop distended with a water soluble radi-opaque medium (Hypaque) is presented. No drug combination tested (pentobarbital, xylocaine, Hypaque 50, probanthine, aminophylline, secretin, cholecystokinin-pancreozymin) led to consistent filling of the pancreatic ducts at low pressures. Filling of the pancreatic ducts was extremely inconsistent, and there was no consistency in the time of reflux. Continual addition of xylocaine during the initial 30 min of each experiment was necessary to maintain an intraluminal pressure of 50 mm Hg. Evidence of urinary excretion of Hypaque was found in 85% of the animals that were radiographed, probably due to absorption through the intestinal mucosa rather than through the pancreatic acini. No significant difference was noted between the microscopic appearance of the pancreas of animals that showed reflux and those that did not.

6037 UNCOMMON ROENTGENOLOGIC MANIFESTATION OF PANCREATIC CARCINOMA. (E.) Blatt, C. J., R. G. Bernstein (Albert Einstein Med. Coll. Hosp., Bronx, N. Y.) and F. Lopez. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):119-124, 1971.

6038 AN UNUSUAL CASE OF ABERRANT PANCREAS IN THE STOMACH. A ROENTGENOGRAPHIC AND GASTROPHOTOGRAPHIC DEMONSTRATION. (E.) Stone, D. D., H. O. Riddervold and T. E. Keats (U. Virginia Sch. Med., Charlottesville). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):125-128, 1971.

6039 PANCREATIC CYSTS: A REPORT OF 10 CASES. (E.) Olurin, E. O. (Univ. Coll. Hosp., Ibadan, Nigeria). *Br. J. Surg.* 58(7):502-508, 1971.

6040 CANCER OF THE PANCREAS WITH MULTIPLE NODULAR SUBCUTANEOUS METASTASES. (Sp.) Die Goyanes, A. (Natl. Cancer Inst., Madrid). *Hosp. Gen. (Madr.)* 10(6):705-714, 1970.

6041 SURGICAL PROBLEMS OF ANNULAR PANCREAS IN THE NEWBORN. (Hun.) Danko, J. (V. B. Madarasz Street Infant. Hosp., Budapest), J. Bukovinszky and G. Wein. *Orv. Hetil.* 112(6): 327-330, 1971.

6042 SCANNING OF THE PANCREAS. (Fr.) Leger, L. (Cochin Hosp., Paris), J. C. Roucayrol and M. Comet. *Rev. Prat. (Paris)* 21(12):2137-2141, 1971.

6043 STUDY ON THE FREQUENCY OF MUCOVISCIDOSIS AND MECONIUM ILEUS. (Dut.) Anders, G. J. P. A. (State U. Inst. Anthropol. Genet., Groningen, Netherlands) and L. P. Ten Kate. *Med. Contact* 26(11):306, 1971.

6044 CHRONIC STEATORRHEA IN CHILDREN DUE TO CONGENITAL DEFICIENCY OF PANCREATIC LIPASE. (Fr.) Verger, P. (Pediatr. Clin., Bordeaux, France), R. Babin and J. M. Guillard. *Pediatrie* 26(3):285-290, 1971.

6045 ARTERIOGRAPHIC DIAGNOSIS OF CHRONIC INFLAMMATION AND ADENOCARCINOMA OF THE PANCREAS. (Pol.) Grzybkowska, B. (Med. Acad. Inst. Radiol., Poznan, Poland), J. Wojtowicz, A. Krokowicz and B. Pawlak. *Pol. Przegl. Radiol. Med. Nukl.* 35(2):157-167, 1971.

6046 DIAGNOSTIC AND THERAPEUTIC PROBLEMS IN PANCREATIC PSEUDOCYSTS. (Ger.) Gay, B. (Martin Luther Univ. Surg. Clin., Halle-Wittenberg, Germany). *Zentralbl. Chir.* 96(9): 306-314, 1971.

6047 CONGENITAL POLYCYSTIC PANCREAS. (Ger.) Siafarikas, C. (City Hosp., Krefeld, Germany) and D. Dennhardt. *Z. Kinderchir.* 9(3-4):381-386, 1971.

6048 ARTERIAL EROSIONS OF PANCREATIC PSEUDOCYST. ANGIOGRAPHIC STUDY OF 6 CASES. (Fr.) L'Hermine, C. (CHU City Hosp., Lille, France), C. Gautier Benoit, M. Vankemmel and G. Lemaitre. *Ann. Radiol. (Paris)* 14(1-2): 55-63, 1971.

6049 FACTORS PREDISPOSING TO PANCREATIC CANCER. (Ger.) Dorken, H. (Univ. 1st Med. Clin., Hamburg, Germany) and H. Bakker. *Diagnostik* 4(5):212-213, 1971.

See also numbers: 5405, 5645, 5646, 5690, 5691, 5692, 5693, 5694, 5695, 5707

6050 PATHOGENESIS OF ACUTE PANCREATITIS AND CHANGES OF PANCREATIC DUCTAL MUCOSA. (E.) Mizumoto, R. (Kyoto U. Med. Sch., Japan), H. Kuratsuka, K. Kira and I. Honjo. *Am. J. Surg.* 122(3):398-401, 1971.

Mucopolysaccharides were infused into rabbit patent pancreatic ducts at low pressure, mixed with pancreatitis-inducing agents such as bile, trypsin or phospholipase A. The infusion of homologous bile or trypsin solution alone produced only minimal macroscopic changes. Following β-glucuronidase solution, there was mild depletion of the thin layer and goblet cells of the medium sized pancreatic ducts and mild round cell infiltration of the parenchyma and edema. A bile and β-glucuronidase mixture caused serious hyperemia, swelling, and turbidity associated with disappearance of pancreatic lobules. Also the thin layer and goblet cells disappeared, the epithelial lining became short and uneven, and a part of the major pancreatic duct was ruptured. After the infusion of trypsin and β-glucuronidase, there was a severe necrotizing pancreatitis but only minimal changes in the ductal system. Phospholipase A either alone or with hyaluronidase caused hyperemia and glandular swelling, but no damage to the pancreatic ductal system. The underlying mechanism of pancreatitis induced by a mixture of bile and β-glucuronidase may be the rupture of the pancreatic ductal wall, whereas pancreatitis induced by a trypsin-β-glucuronidase mixture may be due to changes in the periacinar spaces.

6051 DIABETIC RETINOPATHY IN CHRONIC PANCREATITIS. (E.) Sevel, D. (Groote Schuur Hosp., Cape Town, South Africa), J. H. Bristow, S. Bank, I. Marks and P. Jackson. *Arch. Ophthalmol.* 86(3):245-250, 1971.

The incidence of diabetic retinopathy was found to be 7.4% (2 patients) in a group of 27 patients who have pancreatitic diabetes as compared to 30% (6) in a group of 20 patients with essential diabetes (controls). The 2 groups were matched as closely as possible with respect to age, sex and duration of diabetes. Criteria for the diagnosis of retinopathy was venous congestion, microaneurysms, hard exudates, and retinal hemorrhages. The earliest signs were microaneurysms. Case histories of the 2 patients in the pancreatitic group found to have diabetic retinopathy are presented. Both patients had calcific pancreatitis. A review of the literature revealed only 5 other occurrences of diabetic retinopathy following pancreatic disease. It is suggested that pancreatitic diabetics are protected against retinopathy either by a relatively deficient growth hormone level or a relative hypolipidemia.

6052 EVALUATION OF CORRECTIVE SURGERY FOR PANCREATITIS BY SE^{75} SELENOMETHIONINE PANCREATIC IMAGING. A CASE REPORT. (E.) Eaton, S. B., Jr. (Letterman Gen. Hosp., San Francisco, Calif.), A. E. James, Jr., M. S. Potsaid and G. L. Nardi. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 112(4):678-681, 1971.

Results of ^{75}Se-selenomethionine pancreatic scintigram in a 40-yr-old Caucasian female with chronic relapsing pancreatitis are presented. A preoperative scintigram failed to demonstrate the pancreas. A second pancreatic scintigram, obtained 2 weeks after sphincterotomy and sphincteroplasty, showed little change from the preoperative study. During the succeeding months, however, her symptoms progressively diminished in frequency and intensity and 8 months postoperatively a third scintigram was interpreted as showing essentially normal pancreatic accumulation of ^{75}Se-selenomethionine. Because of their mutual dependence upon pancreatic protein synthetic activity, it was expected that the results of pancreatic imaging and pancreatic function testing will be parallel in most instances. Since subjective testimonial evidence can be confusing and contradictory, patients who have abdominal surgery designed to improve symptoms resulting from benign gastrointestinal disorders (e.g. cholecystitis, hiatus hernia), a means of objectively documenting the physiologic effectiveness of operative intervention may be of value.

6053 CHRONIC PANCREATITIS. (Sp.) Longo, O. F. (San Roque Hosp., Cordoba, Argentina), L. A. Mammana, J. D'Agostino and J. Barros. *Rev. Esp. Enferm. Apar. Dig.* 35(1): 25-34, 1971.

6054 THE PROTECTIVE EFFECT OF TRASYLOL VERSUS CONTRAST MEDIA-INDUCED PANCREATITIS. (E.) Wollowick, H. E. (Columbia-Presbyterian Med. Ctr., New York, N. Y.), R. L. Waldron and S. A. Woo. *J. Can. Assoc. Radiol.* 22(1):40-43, 1971.

6055 PANCREATITIS. CAUSE, ETIOLOGIC FACTORS AND COMPLICATIONS. (E.) Colbert, R. C. (William Beaumont Gen. Hosp., El Paso, Tex.). *Southwest. Med.* 52(1):6-11, 1971.

6056 DIFFERENTIAL DIAGNOSIS OF ACUTE PANCREATITIS. (Ger.) Tarbiat, S. (Univ. Surg. Clin., Dusseldorf, Germany) and H. D. Schulte. *Zentralbl. Chir.* 96(11):382-386, 1971.

6057 SEVENTEEN CASES OF EMERGENCY PANCREATECTOMY IN ACUTE PANCREATITIS. (Fr.) Hollender, L. F. (CHU 3rd Gen. Surg. Serv., Strasbourg, France), M. Gillet and J. J. Kohler. *Presse Med.* 79(8):350, 1971.

6058 ACUTE POSTOPERATIVE PANCREATITIS. (Pol.) Glinski, M. (Med. Acad. Ist Surg. Clin., Zabrze, Poland) and M. Pardela. *Pol. Tyg. Lek.* 26(1):27-30, 1971.

6059 A CASE OF RELAPSING ACUTE PANCREATITIS IN SYSTEMIC LUPUS ERYTHEMATOSUS. (Rus.) Filimonova, R. G., Z. G. Aprosina and I. E. Tareeva. *Ter. Arkh.* 43(4):49-52, 1971.

See also number: 5658

6060 THE MANAGEMENT OF ACUTE HEPATIC FAILURE. (E.) Sherlock, S. (Roy. Free Hosp., London) and S. P. Parbhoo. *Postgrad. Med. J.* 47(549):493-498, 1971.

Signs, symptoms, pathogenesis and management of acute hepatocellular failure were reviewed. The most frequent cause of acute hepatocellular failure is acute viral hepatitis, one of the earliest signs being change in the personality (antisocial behavior or character disorders). Other danger signs are a decrease in the liver size or decreased brain activity on electroencephalogram. Due to high ammonium levels, reflections of failure of the Krebs-Henseleit cycle, patients are given no protein by mouth and the colon is emptied by enema. As hypoglycemia is occasionally seen, at least 1600 calories are supplied daily as glucose drinks or as 20% glucose through a gastric drip. After recovery from hepatocellular failure, i.v. salt-depleted albumin is often useful for replenishing the reduced albumin pool. Deficiencies of prothrombin, clotting factors VII, IX, and X, fibrinogen and vitamin K, all manufactured normally in the liver, and all necessary for maintenance of blood coagulation, can be corrected by transfusion of stored bank blood. There may be a place for corticosteroid therapy in the early stages of the disease, since it improves hepatic storage of BSP by improving bilirubin metabolism in the hepatic cell and the absolute synthetic rate for albumin.

6061 THE RESPONSE OF THE LIVER TO IMPLANTATION OF ARTIFICIAL BILE DUCTS. (E.) Aterman, K. (Dalhousie U. Dept. Pathol., Halifax, Nova Scotia, Canada), H. Lau and D. A. Gillis. *J. Pediatr. Surg.* 6(4):413-420, 1971.

The alleviation of experimentally-induced obstructive jaundice (common bile duct ligation) by implantation in liver parenchyma of perforated silicone rubber or silver "artificial bile dicts" was studied in dogs. A functional artificial bile duct could not be achieved by this method. Detailed study of the histological response to the implantation of cannulas showed an encapsulating fibrous tissue response that becomes more dense with time. In some instances granulation tissue penetrated through the pores of the artificial duct into the lumen, thus obstructing drainage. Proliferation of the bile ducts was not observed nor was their penetration into the tissue capsule.

6062 NONCIRRHOTIC PORTAL FIBROSIS. (E.) Sama. S. K. (All-India Inst. Med. Sci., New Delhi, India), S. Bhargava, N. Gopi Nath, J. R. Talwar, N. C. Nayak, B. N. Tandon and K. L. Wig. *Am. J. Med.* 51(2):160-169, 1971.

Clinical, biochemical, roentgenologic, hemodynamic immunologic, histologic and ultrastructural features of noncirrhotic portal fibrosis (portal hypertension without demonstrable intrahepatic or extrahepatic obstruction) in 75 of 300 cases of portal hypertension were studied. Most patients presented with marked splenomegaly, recurrent esophageal hemorrhage and minimal features of hepatocellular failure. Alpha-globulin, β-globulins and immunoglobulin G were elevated. There was a marked gradient between splenic pressure and wedged hepatic vein pressure indicating an increase in presinusoidal resistance; hepatic blood flow was generally normal. Roentgenologically the portal and splenic veins were dilated and tortuous, esophageal varices were marked and hepatofugal collaterals were evident. The gross appearance of the liver at shunt surgery or autopsy varied from normal to distinctly nodular, resembling cirrhosis. Hepatic architecture was fairly well preserved on needle biopsy specimens except for nonspecific fibrotic and necrotic changes. Wedge biopsy revealed focal occlusive changes in the medium sized radicals of the portal vein, changes considered specific for this disease. On electron microscopy the space of Disse was collagenized and widened. The operative mortality following shunt surgery in 26 patients was 10.7%. Splenorenal shunt was better tolerated than portocaval shunt, but was associated with postoperative bleeding in 18.8% of the cases.

6063 ANOMALOUS SERUM PROTEIN IN HEPATOCARCINOMA AND HEPATIC METASTASES. (E.) Lippi, U. (P. Cosma Hosp., Padua, Italy), A. Villa, R. Pavan and G. Guidi. *Am. J. Clin. Pathol.* 56(2):227-229, 1971.

Disk electrophoresis was used to analyze 381 serum specimens from healthy individuals and patients with hepatic mestastases or hepatocarcínoma. In the electrophoretic patterns of some sera an extra band was detected, migrating in the polyacrylamide gels as a postalbumin (α_1 region). This protein abnormality was directly related to the presence of primary or secondary hepatic neoplasms. The anomalous protein was not found in sera from children or adults with viral hepatitis, treated with corticoid therapy or not, or infectious hepatitis, with or without Australia antigen. The protein was also absent in sera from newborns and in sera from patients with extrahepatic diseases (neoplastic or not); this protein seems to have no antigenic properties. Possibly a protein produced by the hepatic cell is a response to inflammation produced by the hepatic metastases or by the primary hepatic tumors.

6064 BILIARY LIPID SECRETION AND BILE COMPOSITION AFTER ACUTE AND CHRONIC INTERRUPTION OF THE ENTEROHEPATIC CIRCULATION IN THE RHESUS MONKEY. IV. PRIMATE BILIARY PHYSIOLOGY.

(E.) Dowling, R. H. (Postgrad. Med. Sch., London), E. Mack and D. M. Small. *J. Clin. Invest.* 50(9): 1917-1926, 1971.

After complete acute interruption of the enterohepatic circulation (production of total biliary fistula) bile volume and secretory rates remained normal or high for 2 hr, the volume then falling moderately and secretion rates decreasing markedly to reach low points at about 4 hr. Bile salt decreased to a greater extent than phospholipid and cholesterol, and the bile was supersaturated with cholesterol. Between 12 and 24 hr after interruption of the enterohepatic circulation, a new steady state was reached in which there was a relative deficiency of bile salt and an increase in phospholipid and cholesterol. Hence, within hours after interruption, a bile instability which is conductive to gallstone formation occurs. Bile composition after chronic interruption of the enterohepatic circulation by large scale (two-thirds) ileal resection produced less marked changes, the cholesterol remaining soluble in the bile because of a concomitant relative increase in phospholipid. After controlled interruption, secretion rates and the relative concentrations of bile salt, phospholipid and cholesterol did not change from control values until more than 20% of the bile was diverted. Acute interruption of the enterohepatic circulation in humans, as during prolonged fasting when the bile salt pool rests in the gallbladder and does not circulate, could be related to gallstone formation.

6065 HUMAN-BABOON CROSS-CIRCULATION FOR TREATMENT OF HEPATIC COMA. (E.)

Hollander, D. (Wilford Hall USAF Med. Ctr., Lackland, AFB, Tex.), G. Klebanoff and R. T. Osteen. *JAMA* 218(1):67-71, 1971.

A 49-yr-old white male alcoholic admitted with hepatic failure due to alcoholic hepatitis was cross-circulated with a baboon for 5½ hr, when his renal function tests continued to deteriorate. At the onset of the cross-circulation the patient was unresponsive to painful stimuli but within 6 hr showed spontaneous movements, response to deep pain, and response to voice stimuli in that order. Despite dramatic improvement in mental status, 10 hr after termination of cross-circulation, the patient's liver and renal function tests began to deteriorate rapidly. However, by 36 hr the patient could follow simple commands and his encephalopathy gradually disappeared. A follow-up evaluation disclosed a normal serum bilirubin value, alkaline phosphatase level, SGOT level and serum albumin value. Neurological evaluation disclosed no abnormalities and his mentation was normal. Heterologous cross-circulation merits farther evaluation as a therapeutic modality for fulminant hepatic failure.

6066 LEIOMYOSARCOMA OF HEPATIC VEIN AND THE BUDD-CHIARI SYNDROME. (E.)

MacMahon, H. E. (Tufts-New England Med. Ctr., Boston, Mass.) and H. G. Ball, III. *Gastroenterology* 61(2): 239-243, 1971.

Leiomyosarcoma underlying the Budd-Chiari syndrome is reported in an elderly male patient who died in ultimate hepatic and renal failure. The primary site of the leiomyosarcoma was a hepatic vein in the liver. It protruded into the inferior vena cava leading to venous stasis and edema in the lower extremities and abdomen. Based on size, the tumor had been latent in the liver and inferior vena cava long before edema became serious. Venous thrombosis subsequent to an exploratory laparotomy and not the tumor is believed to have initiated an abdominal catastrophe by blocking blood flow from the liver with extensive necrosis of the liver, portal hypertension, uncontrollable ascites, and hepatic and renal failure. This is believed to be the second case reported of a leiomyosarcoma arising in a hepatic vein underlying the Budd-Chiari syndrome. A brief discussion of other conditions causing the Budd-Chiari syndrome is included.

6067 CHOLANGIOGRAPHIC FINDINGS IN DISEASES OF THE LIVER: A POSTMORTEM STUDY.

(E.) Legge, D. A. (U. Minnesota Mayo Grad. Sch. Med., Rochester), H. C. Carlson and J. Ludwig. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):34-40, 1971.

Cholangiograms were performed in 100 autopsy cases to evaluate intrahepatic changes in a variety of hepatic diseases. Of the 100 cases, 67 were normal both cholangiographically and anatomically. Of the remaining 33, 2 had lymphomatous involvement of the liver but normal cholangiograms, 7 had cholangiographic changes resulting from previous cholecystectomy or from advanced age, 15 had abnormal cholangiograms due to metastatic involvement of the liver (13 cases) or lymphomatous infiltration (2 cases), and the remaining 9 had cholangiographic changes caused by fatty changes of the liver (3 cases), post-necrotic cirrhosis (5 cases) and cholangiolitic hepatitis (1 case). In most cases with previous cholecystectomy there was dilatation of the intrahepatic ducts, whereas in cases with carcinomatous liver metastases there was displacement with or without narrowing and dilatation. Straightening and elongation of the intrahepatic ducts was seen in association with 2 of 4 cases of lymphoma and fatty infiltration. Cirrhosis was associated with crowding and displacement of ducts. In 1 case of cholangiolitic hepatitis the cholangiogram showed crowding and displacement associated with multiple areas of focal narrowing in the ducts as well as marked dilatation of the left hepatic ducts without filling of the peripheral branches.

6068 HEPATIC CRYOSURGERY. ACUTE AND LONG-TERM EFFECTS. (E.)

Healey, W. V. (Roosevelt Hosp., New York, N. Y.), C. J. Priebe, Jr., S. M. Farrer and L. L. Phillips. *Arch. Surg.* 103(3):384-392, 1971.

Forty-nine hepatic lobes from 34 dogs were frozen from 5 to 60 min with a liquid nitrogen cryoprobe. Bleeding from the injured liver was promptly controlled as the tissue became solidly frozen. When the probe was warmed and withdrawn from the tract of injury, thawing slowly occurred and bleeding ensued from the deep liver fracture sites. Eleven of 34 animals died during the first 24 hr following surgery due to continued blood loss. In 22 animals bleeding was controlled with sutures and these dogs did well after freezing of up to 350 cubic cm of hepatic parenchyma. The cryoprobe permitted controlled destruction of a sharply demarcated area of liver. Necrosis, peripheral inflammation and slow resorption occurred. Minimal scar tissue was present in 4-6 months. Platelets and fibrinogen levels were decreased and prothrombin and partial thromboplastin times were prolonged in animals with frozen livers. These changes suggested that disseminated intravascular coagulation may have occurred immediately after the necrosis. Hence, freezing produces temporary hemostasis in severely injured canine liver.

6069 INTRAHEPATIC OBSTRUCTIVE JAUNDICE DUE TO AMYLOIDOSIS OF THE LIVER. A CASE REPORT AND REVIEW OF THE LITERATURE. (E.) Levy, M. (Hadassah U. Hosp., Jerusalem), C. H. Fryd and M. Eliakim. *Gastroenterology* 61(2):234-238, 1971.

The main clinical manifestations in a 57-yr-old male with severe intrahepatic obstructive jaundice were pruritus, weight loss, acholic stool, abdominal pain, hepatomegaly, ascites, and gastrointestinal bleeding. The appearance of elevated alkaline phosphatase and cholesterol levels, normal or slightly elevated transaminase activity, and negative flocculation tests raised the possibility of extrahepatic biliary obstruction by a stone in the common duct or by a pancreatic tumor. This suspicion was further substantiated by the alleged rarity of jaundice (5%) in amyloidosis of the liver and by the fact that amyloidosis may be secondary to malignancy. However, postmortem examination revealed that the sole cause of the jaundice was amyloid deposition in the liver which strangled the hepatic cells, encased the bile ducts, and caused severe bile stasis. The pancreas, although enlarged, did not compress the common bile duct. A review of the literature revealed 4 additional cases where intrahepatic biliary obstruction was due to amyloidosis of the liver, presenting a difficult diagnostic problem.

6070 TRAUMATIC HEPATIC SEQUESTRA. (E.) Turrill, F. L. (540 N. Central Ave., Glendale, Calif.), A. J. Donovan and F. L. Facey. *Am. J. Surg.* 122(2):175-182, 1971.

Five patients with hepatic sequestra due to blunt trauma to the abdomen resulting in major injury to the right lobe of the liver are presented. Closure of the liver fracture was performed in 3 cases, right hepatic lobectomy in 1 case, and in the patient with a large hematoma under an intact Glisson's capsule, suturing was not considered necessary. Each patient presented a diagnostic dilemma regarding the cause of persistent fever after the initial operative procedure, apparently adequate drainage, and appropriate intensive antibiotic therapy. The critical diagnostic studies in identification of a hepatic sequestrum in each instance proved to be scintillation scanning of the liver, injection of contrast material into sinus tracts, and/or T-tube cholangiography. The use of anteroposterior and lateral scannograms in combination proved to be particularly helpful in the localization of sequestra and in deciding where to make the incision for their removal.

6071 PRIMARY LIVER CANCER. (E.) Curutchet, H. P. (Med. Coll. Virginia, Richmond), J. J. Terz, S. Kay and W. Lawrence, Jr. *Surgery* 70(3):467-479, 1971.

The records of 65 patients with histologically proven primary liver cancer observed over an 18-yr period were reviewed with regard to clinical and laboratory findings and surgical treatment. The most frequent presenting symptoms were pain (88%) and weight loss (77%) with abdominal pain localized in the right upper quadrant in 61%. Serum bilirubin levels were elevated in 24 patients initially and in 17 of the other 41 in subsequent studies. BSP retention was abnormal in most cases (91%). In 18 of 22 patients (81%) liver scans with abnormalities diagnostic of primary liver cancer were observed. Primary tumors arose in cirrhotic livers in 60% of these patients in whom cirrhotic changes could be determined (47% overall). The histologic diagnosis was made on biopsy material obtained at laparotomy in 44 patients, from percutaneous needle biopsy in 19, and at autopsy in 3. While 20 patients underwent an exploratory laparotomy for diagnostic purposes only, 33 underwent this procedure for consideration of primary resection. Of the 33 cases lobectomy was performed in 6 and transplantation in 1. All 6 of the lobectomy patients survived the operation and 2 are still alive 31 and 36 months after surgery.

6072 A COMPARISON OF HEMOSIDEROSIS AND HEMATOPOIESIS AFTER END-TO-SIDE AND SIDE-TO-SIDE PORTACAVAL SHUNT. (E.) Doberneck, R. C. (U. New Mexico Sch. Med., Albuquerque). *Surgery* 70(3):428-431, 1971.

Weight loss, hemosiderosis, and hematopoiesis following end-to-side and side-to-side portocaval shunt were compared in dogs. Hepatic hemosiderin increased markedly in 9 of 11 dogs after end-to-side portocaval shunt but in only 4 of 12 dogs after side-to-side shunt. Mean splenic hemosiderin increased markedly after end-to-side shunt but only moderately after side-to-side shunt. While weight loss was marked after end-to-end shunt (mean 28%) it was minimal after side-to-side shunt (9%). Ten of 11 dogs died after end-to-side shunt, whereas only 3 of 12 dogs died after side-to-side shunt. The mean rib marrow space occupied by fat increased moderately following both procedures indicating a depression of hematopoiesis.

6073 HEPATOMA DEVELOPING IN HEMOCHROMATOSIS IN SPITE OF ADEQUATE TREATMENT BY MULTIPLE PHLEBOTOMIES. (E.) Hines, C., Jr. (Alton Ochsner Med. Found., New Orleans, La.), W. D. Davis, Jr. and W. A. Ferrante. *Am. J. Dig. Dis.* 16(4):349-355, 1971.

A case of hepatoma which developed in a patient following multiple phlebotomies for hemochromatosis is presented. At laparotomy, biopsy of the liver revealed that the liver tissue not involved with tumor was free of any sign of hemochromatosis, other than cirrhosis. Serum iron studies were no longer compatible with a diagnosis of hemochromatosis, and the patient's blood sugar and insulin response were normal. Six months after the discovery of the hepatoma (31 months after beginning phlebotomy treatment and 6 months after the last treatment) serum iron was 68 mg, unsaturated transferrin was 248 mg, and total transferrin was 316 mg. The apparent increased incidence of carcinoma in hemochromatosis (as opposed to nutritional cirrhosis) may indicate a possible role for iron as a permissive agent in the development of carcinoma.

6074 INTRAHEPATIC CHOLESTASIS OF PREGNANCY AND ITS TREATMENT WITH CHOLESTYRAMINE. (E.) Huisjes, H. J. (Groningen U. Hosp., Netherlands). *Eur. J. Obstet. Gynecol.* 1(1): 11-19, 1971.

In a study of about 3700 pregnancies over a period of 3 yr, 12 were found to have intrahepatic cholestasis. The clinical picture was always dominated by pruritus. In 7 patients mild to moderate jaundice was also diagnosed. All pregnancies except 3 ended spontaneously before the end of the 38th week. In 2 parturitions a hemorrhage of 500 ml or more was observed. Two patients had a positive family history. Laboratory data included a variable alkaline phosphatase elevation and a postpartum dip in bilirubin. Recurrence of cholestasis (2 of 3) after cholecytectomy would seem to exclude a causal relationship between the two, but a common predisposition to both disorders might be possible. Treatment with cholestyramine resin generally gave good results with partial relief being achieved in most patients.

6075 EFFECT OF EXPERIMENTAL PORTAL HYPERTENSION ON THE GASTROINTESTINAL TRACT IN THE RAT. (Fr.) Guerrin, F. (CHU Sch. Med., Lille, France), J. P. Latreille, J. Baillet and B. Gosselin. *C. R. Soc. Biol. (Paris)* 164(10): 2047-2051, 1970.

By a modification of Dragstedt's technique, portal hypertension was induced in Wistar rats by 2-step ligation of the portal trunk at 8 hr intervals. Microscopic changes in the glandular stomach were found in 17 of 34 rats and consisted of mucosal congestion (8), inflammation (7), superficial necrosis (7), and mucosal ulceration (4). Intestinal changes, which were not visible on gross examination, were found in 14 of 20 rats and consisted of mucosal congestion (11), inflammation (1), and superficial necrosis (6); none of the rats developed intestinal ulcers. The mean pH of the gastric mucosa of 30 rats, measured 2-164 days after portal ligation, was significantly higher in rats with portal hypertension than in controls while no appreciable difference was found in the pH of the jejunal mucosa in these 2 groups of animals. Changes in the gastric mucosa of rats with portal hypertension are attributed, at least partially, to the development of portocaval anastomoses which decrease blood flow and result in tissue hypoxia and necrosis. The extent to which hemodynamic disorders were compensated might account for the presence or absence of gastrointestinal changes in rats with portal hypertension.

6076 LIVER MORPHOLOGY AND BIOCHEMISTRY IN EIGHT OBESE PATIENTS TREATED WITH JEJUNOILEAL ANASTOMOSIS. (E.) Juhl, E. (Bispebjerg Hosp., Copenhagen), P. Christoffersen, H. Baden and F. Quaade. *N. Engl. J. Med.* 285(10): 543-547, 1971.

The effect of jejunoileal anastomosis on liver morphology and function was studied in 10 surgically treated obese patients. At no time did the patients present clinical evidence of liver disease. Prothrombin decreased, but remained within normal limits, and BSP retention, which was slightly elevated before operation, became normal. No significant changes were observed in alkaline phosphatase, aspartate transaminase, bilirubin, serum albumin or serum γ-globulin. Of 7 patients biopsied both during and after surgery, steatosis increased in 3, decreased in 3, and was unchanged in 1. Extreme degrees of fatty changes were noted in 2 patients at operation, but were not observed following surgery. Weight loss or length of follow-up time did not correlate with changes in degree of fatty infiltration.

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ACUTE NONVIRAL HEPATITIS AND HEPATIC INJURY

6143 CHANGES IN BILE FORMATION AND BILE CAPILLARIES DURING THE DEVELOPMENT OF EXPERIMENTAL HEPATITIS AND CIRRHOSIS. (Ger.) Werin, W. K. (Kalinin Med. Inst., USSR). *Zentralbl. Allg. Pathol.* 114(2):202-208, 1971.

Significant changes in bile formation and storage, structure of bile canaliculi and ATPase activity were found in the livers of Wistar rats at different stages of hepatitis and cirrhosis induced by chronic poisoning (up to 11 months) with carbon tetrachloride (CCl4; 0.2 ml/100 g p.o.). The synthetic process of bile formation in viable liver cells did not seem to be disturbed, but the number of intrahepatic bile canaliculi was reduced and their structure changed causing decreased secretion and drainage. The changes were reversible: bile secretion and structure of capillaries normalized 6-9 months after discontinuation of CCl$_4$ administration.

6144 EFFECT OF PRETREATMENT WITH BARBITURATES ON CARBON TETRACHLORIDE-INDUCED HEPATOTOXICITY IN RATS. (E.) Gadgil, S. D. (Miraj Med. Coll., Maharashtra, India), V. N. Bhate, N. L. Sadre and N. M. Tiwari. *Indian J. Med. Sci.* 25(6):384-386, 1971.

The effects of diethylbarbituric acid, pentobarbitone sodium and phenobarbitone sodium on CCl4-induced hepatotoxicity was studied in rats. Only phenobarbitone had a definite protective effect on the hepatotoxicity produced by CCl4, indicating that the protective effect was a specific effect of phenobarbitone sodium and was not due to depressant action of barbiturates in general. The protective action may have been due to an antagonistic action of phenobarbitone in CCl$_4$-induced depressed incorporation of amino acids in microsomal proteins, or phenobarbitone may antagonize CCl$_4$-induced dislocation of ribonuclear particles from endoplasmic membranes.

6145 EXTRA LACTATE DEHYDROGENASE ISOENZYME BAND IN SERUM OF PATIENTS WITH SEVERE LIVER DISEASE. (E.) Lubrano, T., A. A. Dietz (VA Hosp., Hines, Ill.) and H. M. Rubinstein. *Clin. Chem.* 17(9):882-885, 1971.

The lactate dehydrogenase (LDH) isoenzyme patterns of 76 patients with liver disease with elevated serum bilirubin levels were studied. Of the 76 patients studied, 43 had an additional band (band "T") between isoenzymes 4 and 5. The majority of these patients had severe liver disease due to some combination of alcoholic cirrhosis, fatty infiltration, and acute necrosis. All but 2 of the patients had a total serum bilirubin concentration greater than 10 mg/100 ml. Of the 42 patients with band T, 30 died during follow-up, 24 during the first month following recognition of the T band. Twenty-four of the 42 patients had extra LDH bands in other locations, most commonly between LDH-2 and 3. There was, however, no correlation between the level of LDH-T activity and the serum bilirubin, total LDH, or LDH-5.

6146 EFFECT OF ETHIONINE AND ETHANOL ON THE FUNCTION OF THE PERFUSED RAT LIVER. (E.) Bassan, H., J. Kendler and H. J. Zimmerman. *Proc. Soc. Exp. Biol. Med.* 137(3):852-857, 1971.

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See also numbers: 5538, 5558, 5655

6160 TREATMENT OF HEPATIC COMA,WITH EXCHANGE TRANSFUSION. (E.) Zacarias, J. (Luis Calvo Mackenna Hosp., Santiago, Chile), P. Brinck and J. Garcia Huidobro. *Am. J. Dis. Child.* 122(3):229-231, 1971.

Fourteen patients with acute viral hepatitis and hepatic coma treated with the conservative method (low protein diet, corticosteroids neomycin sulfate) and exchange transfusion were studied. Those in Grade 3 coma rapidly progressed to Grade 4 except for 3 patients treated with exchange transfusion on admission. Severe jaundice and fetor hepaticus were common symptoms in almost all patients. Laboratory findings typical of severe hepatitis, elevated serum bilirubin, decreased prothrombin times and increased glutamine in the cerebrospinal fluid were uniformly seen. Seven patients survived, 4 of them showing a complete return to normal of liver function and histological appearance. This was a better record than that seen in an earlier series of 10 patients treated by the conservative method only. Exchange transfusion may be an effective therapy for acute hepatic coma, especially in children.

6161 VASCULITIS IN ASSOCIATION WITH AUSTRALIA ANTIGEN. (E.) Gocke, D. J. (Columbia U. Coll. Physicians Surg., New York, N. Y.), K. Hsu, C. Morgan, S. Bombardieri, M. Lockshin and C. L. Christian. *J. Exp. Med.* 134(3, Pt. 2): 330s-336s, 1971.

The association between Australia antigen and the syndromes of diffuse vasculitis was studied in 16 patients with biopsy-proven polyarteritis 6 of whom demonstrated Australia antigenemia. All patients presented with fever accompanied by polyarthralgia, myalgia, rash, urticaria, and hepatic dysfunction; however, in only 1 patient was hepatitis the primary presenting problem. In time, peripheral neuropathies, hypertension, eosinophilia, hematuria, and azotemia appeared. Complexes of Australia antigen and immunoglobulin were demonstrated by ultracentrifugation in these patients. In 2 patients Australia antigen, and immunoglobin and complement were localized within blood vessel walls by immunofluorescent techniques.

6162 VARIATIONS IN IRON, COPPER, TRANSFERRIN, AND CERULOPLASMIN DURING INFECTIOUS HEPATITIS IN CHILDREN. (It.) Norelli, M. T. (U. Turin Pediatr. Clin., Italy), T. Ferrando and R. Agricola. *Minerva Pediatr.* 23(12):511-523, 1971.

Studies of 9 children (4 boys and 5 girls, aged 3-10 yr) with infectious hepatitis and of 10 controls with pharyngitis or tracheopharyngitis showed that serum Fe and Cu levels were normal on admission in infectious hepatitis but increased, reaching a maximum after 15 days. Serum Fe levels decreased to normal after 21-25 days, and serum Cu levels normalized with clinical recovery. Increases in Fe levels are attributed to hepatic cytolysis while those in Cu levels appear to be caused by cytolysis. Increases in serum transferrin and ceruloplasmin levels paralleling the increases in Fe and Cu, resp. were observed in patients with infectious hepatitis. It is suggested that increases in ceruloplasmin and transferrin values are a manifestation of nonspecific defense reactions. It is suggested that serum Fe, Cu, transferrin, and ceruloplasmin levels may be useful in evaluating the extent of liver damage and in establishing a prognosis.

6163 HEPATITIS-ASSOCIATED ANTIGEN HEPATITIS. AN ELECTRON MICROSCOPIC STUDY OF VIRUS-LIKE PARTICLES IN LIVER CELLS. (E.) Huang, S. (McGill U. Pathol. Inst., Montreal, Quebec, Canada). *Am. J. Pathol.* 64(3):483-500, 1971.

In the course of a study on liver complications associated with renal transplantation, liver tissue was obtained from 6 patients who developed hepatitis-associated antigen hepatitis while undergoing immunosuppressive therapy. In 5 of 6 cases, characteristic intranuclear and cytoplasmic virus-like particles were seen in the liver cells by electron microscopy. While under immunosuppressive therapy, the patients showed rapid progression of acute hepatitis to chronic active hepatitis and posthepatitic cirrhosis resulting in liver failure. Virus-like particles had an appearance of nucleocapsid without an outer coat, and were probably the viruses in their natural infective states. The finding of virus-like particles is believed to be diagnostic for hepatitis-associated antigen. Particles were seen in the phagosomes showing an outer membrane and a tail-like structure; both the coated and the noncoated particles were probably the same virus. The lysosomal activity in the infected hepatic cells seemed to be increased. Nonspecific changes in the liver cell nuclei and organelles were seen and were related to viral infection.

6164 FAMILY WITH HEPATITIS-ASSOCIATED ANTIGEN. SPECTRUM OF LIVER PATHOLOGY. (E.) Bancroft, W. H. (Walter Reed Army Hosp., Washington, D. C.), R. L. Warkel, A. A. Talbert and P. K. Russell. *JAMA* 217(13):1817-1820, 1971.

Liver biopsy specimens from 4 hepatitis-associated antigen (HAA) family members including a 5½-month-old infant with giant cell hepatitis were studied. In 2 of the 3 patients who were asymptomatic HAA carriers, the histological findings were compatible with resolving acute viral hepatitis. The other asymptomatic patient had histological changes that indicated chronic aggressive hepatitis. The results of biochemical studies initially done on these 3 patients were either normal or showed nonspecific elevations of LDH and alkaline phosphatase levels. Liver biopsy from the infant showed generalized hepatocyte enlargement with the formation of multinucleated giant cells and pseudoglands, with infiltrative mononuclear cells, proliferating fibroblasts, and newly-formed connective tissue. This pathologic condition was consistent with giant cell hepatitis of infancy. These 4 cases of hepatitis occurring at the same time in the same family illustrated a wide range of liver pathology seemingly caused by the same infectious agent. It is significant that active liver disease would have gone undiagnosed in the 3 asymptomatic patients had they not been tested for HAA.

6165 INFLUENCE OF TYPE AND CONCENTRATION OF SERA IN VITRO ON SUSCEPTIBILITY OF GENETICALLY RESISTANT CELLS TO MOUSE HEPATITIS VIRUS. (E.) Lavelle, G. C. (Natl. Inst. Allerg. Infect. Dis. Rocky Mt. Lab., Hamilton, Mont.) and F. B. Bang. *J. Gen. Virol.* 12(3):233-238, 1971.

The effect of type and concentration of sera on the susceptibility of C_3H cells to the Princeton strain of mouse hepatitis virus (MHV[PRI]) was studied in vitro. C_3H cells incubated with 90% horse serum were destroyed only by high concentrations of virus. However, when the serum was diluted to 20% the destructive effect was observed at 10^{-5} dilution of virus in some cases. In both cases destruction was observed at 4-6 days after inoculation. C_3H cells incubated with mouse sera were highly resistant to MHV[PRI] virus with destruction occurring only with undiluted virus; however, cells incubated with fetal calf serum were highly susceptible, destruction being found at dilutions of 10^{-5}. Cells incubated in rat serum had intermediate susceptibility but when susceptible Pri cells were incubated with C_3H or Pri mouse sera the infectivities obtained were maximal and cellular destruction occurred within 72 hr. An incubation mixture of 20% horse serum and 10% C_3H mouse serum resulted in high resistance. The sera did not seem to inactivate preformed MHV[C3H] virus but suppressed intracellular conversion or adaptation of MHV[PRI] virus to the variant virus MHV[C_3H]. When C_3H cell monolayers were inoculated with MHV[PRI] virus, small plaques 1 mm in diameter appeared after 72 hr. In contrast, MHV[PRI] and MHV[C3H] viruses on susceptible Pri cells produced large plaques of 2-3 mm within 48 hr, increasing to 3-4 mm by 72 hr.

6166 EFFECT OF TETRAHYDROTHIAZOLIDINE-CARBOXYLIC ACID (TCA) ON VIRAL HEPATITIS. (COMPARATIVE CLINICAL STUDY). (Gr.) Triantaphillou, G. T. (Gen. Hosp. Infect. Dis., Athens). *Hellen. Iatr.* 40(2):163-171, 1971.

As compared to 60 controls, p.o. administration of tetrahydrothiazolidine carboxylic acid (900 mg/day for 10 days, reduced to 600 mg/day for 10 days then 300 mg/day for 10 days) to 60 patients with viral hepatitis resulted in significant body weight gain, earlier (8 days) cessation of symptoms (nausea, pain dyspepsia), decrease of SGPT and reduction of WBC. Treatment did not affect blood bilirubin levels. Tolerance was excellent. These results suggest that this drug provides satisfactory recovery and regeneration of damaged cells in patients with viral hepatitis.

6167 AUSTRALIA/SH ANTIGEN IN NORMAL POPULATION AND PATIENTS OF VIRAL HEPATITIS IN DELHI. (E.) Sama, S. K. (All-India Inst. Med. Sci., New Delhi), S. Anand, A. N. Malaviya, P. C. Gandhi and B. N. Tandon. *Indian J. Med. Res.* 59(1):64-68, 1971.

The Indian subjects in this study consisted of 952 normals, 11 patients with serum hepatitis, 97 with epidemic infectious hepatitis, 41 with sporadic infectious hepatitis, 18 with other liver diseases, 30 professional blood donors and 20 patients who had received blood from these donors. The double diffusion test for Au/SH antigen was positive in only 0.1% of normals, 12.2% of those with sporadic and 0% of those with epidemic infectious hepatitis, and 18% of those with serum hepatitis (appearing 8 weeks after an i.m. injection). This antigen was not detected in patients with other liver diseases or in blood donors. However, 4 donors had evidence (transaminase levels) of subclinical hepatitis. Four recipients of their blood developed subclinical hepatitis 15-45 days after transfusion and 2 of the 4 recipients developed Au/SH antibodies (but none developed Au/SH antigens) on the 75th and 90th day after transfusion while recovering from hepatitis.

6168 POLYOL OXIDOREDUCTASE ACTIVITY IN HUMAN BLOOD SERUM DURING ACUTE HEPATITIS. (E.) Pitkänen, E. (Univ. Cent. Hosp., Helsinki, Finland) and C. Servo. *Clin. Chim. Acta* 33(2): 273-278, 1971.

Polyol oxidoreductase activities which may occur in human blood serum during acute hepatitis have been measured using several polyols as substrate. Increased activity was obtained with several polyols; the highest activity was usually obtained with sorbitol, followed by L-iditol, ribitol, xylitol, D-mannitol and L-arabitol. In sera from patients without acute liver damage no polyol oxidoreductase activities were found. The activities found seemed to follow the clinical course of the disease, high enzyme levels being detected at the early stage of the disease. In samples where the polyol oxidoreductase level was 15 U/liver or higher (measured with sorbitol) activity was also demonstrated in the cellulose acetate electrophoresis. The failure to separate the activities towards the various polyols in cellulose acetate electrophoresis and the closely parallel changes in the activities during hepatitis seem to favor the view that the activities are due to one broadly specific enzyme.

6169 ELECTRON MICROSCOPIC OBSERVATIONS AND SPECULATIONS ON AUSTRALIA ANTIGEN. (E.) Almeida, J. D. (Roy. Postgrad. Med. Sch., London). *Postgrad. Med. J.* 47(549):484-487, 1971.

Electron microscopic observations and speculations on Australia antigen were made in carriers of serum hepatitis, patients suffering from serum hepatitis and patients with persistent viral hepatitis. Simple centrifugation of the serum specimen followed by negative staining of the pellet allows visualization of the antigen. In addition to showing the presence of the antigen, different patterns of distribution could be seen on the microscope grid associated with different states. The sera from 4 carriers was found to have the antigen randomly distributed. However, in 3 cases of serum hepatitis the Australia antigen changed from an initially random distribution to an aggregated one and finally these aggregates disappeared from the serum. The aggregates may represent the appearance of antigen-antibody complexes. In serum from a small number of antigen-positive patients with persistent viral hepatitis, electron microscope examination revealed the presence of Australia antigen for periods up to 1 yr. Four different morphological groups of Australia antigen were described: the spheres and tubules of Australia antigen, the particles described by Dane (double-shelled 420 Å particles), the 200 Å particles seen on thin sectioning and the 270 Å present in liver homogenates. Possible natures and interrelationships of these 4 distinct groups were discussed.

6170 POST-TRANSFUSION HEPATITIS: A REVIEW AND PROSPECTUS. (E.) Polesky, H. F. (Minneapolis War Mem. Blood Bank, Minn.). *Hum. Pathol.* 2(3):441-451, 1971.

6171 HEPATITIS AND ACTIVITY. (E.) Krikler, D. M. (Prince of Wales Hosp., London). *Postgrad. Med. J.* 47(549):490-492, 1971.

6172 ISOLATION OF HOMOLOGOUS AUSTRALIA ANTIGEN ANTIBODIES BY IMMUNOADSORPTION. (Ger.) Lehmann, H. E. (Univ. Med. Clin., Heidelberg, Germany), R. Sanwald and W. Rapp. *Klin. Wochenschr.* 49(16):943-944, 1971.

6173 AUSTRALIA ANTIGEN AND ANTI-TISSUE ANTIBODIES IN HEPATOLOGY. (Fr.) Bonnet Eymard, J. and G. C. Girona. *Grenoble Med. Chir.* 8(20):905-920, 1970.

6174 CARDIAC DISEASE AND VIRAL HEPATITIS. (E.) Umali, F. (Misericordia Fordham Affiliat. Hosp., Bronx, N. Y.), L. Gould and R. F. Gomprecht. *Clin. Res.* 19(2):343, 1971.

6175 STUDIES ON THE COURSE OF THE ILLNESS IN ACUTE VIRAL HEPATITIS. A CLINICAL AND EPIDEMIOLOGIC STUDY. (Ger.) Eisenburg, J. (U. Munich 1st Med. Clin., Germany) and A. Christoforis. *Fortschr. Med.* 89(8):317-323, 1971.

6176 THE DYNAMICS OF URINARY VITAMIN C ELIMINATION IN THE COMMON CLINICAL FORM OF VIRAL HEPATITIS (RESULTS OBTAINED IN SIX CASES). (Rum.) Barna, G. (IMF 1st Clin. Infect. Dis., Bucharest, Rumania), L. Paun and A. Isbasescu. *Viata Med.* 18(5):227-230, 1971.

6177 INVESTIGATIONS ON AUSTRALIA ANTIGEN IN 150 PATIENTS WITH VIRAL HEPATITIS IN THE PLOIESTI HOSPITAL OF COMMUNICABLE DISEASES. (Rum.) Fulga, C. (Hosp. Infect. Dis., Ploiesti, Rumania) and N. Constantinescu. *Viata Med.* 18(7):313-314, 1971.

6178 TRIAL OF TREATMENT OF SEVERE VIRAL HEPATITIS WITH HYPERBARIC OXYGEN (REPORT OF 16 CASES). (Fr.) Goulon, M. (Raymond Poincare, Hosp., Garches, France), M. Rapin and A. Barois. *Ann. Med. Interne (Paris)* 122(1):93-98, 1971.

6179 CURRENT MEANS OF CONTROLLING THE DISSEMINATION OF VIRAL HEPATITIS. (Fr.) Laverdant, C. and M. Vigy. *Concours Med.* 93(13):2309-2315, 1971.

6180 AUSTRALIA ANTIGEN AND LIVER FUNCTION TESTS FOLLOWING INFECTIOUS HEPATITIS. A STUDY OF 111 PATIENTS OF QUEST OF AIDS IN BLOOD DONOR SCREENING. (E.) Johnston, D. G. (St. John's Hosp., Oxnard, Calif.), N. Powell, Jr. and G. Gitnick. *Calif. Med.* 114(4):14-18, 1971.

6181 CLEARANCE OF C_{14} BILIRUBIN IN VIRAL HEPATITIS (EPIDEMIC HEPATITIS AND SERUM HEPATITIS) IN THE HUMAN. (Ger.) Schmidt, M. (U. Munich 1st Med. Clin., Germany), J. Eisenburg and W. Stich. *Fortschr. Med.* 89(8):342-345, 1971.

6182 COMPARISON BETWEEN IMMUNODIFFUSION AND ELECTROIMMUNODIFFUSION IN THE SEARCH FOR 'AUSTRALIA' SYSTEM IN VARIOUS LIVER DISEASES.

(Sp.) Guardia, J. (City Hemother. Sanitar., Barcelona, Spain), J. M. Martinez Vazquez and R. Bacardi. *Med. Clin. (Barc.)* 56(3):335-338, 1971.

6183 EXTRACORPOREAL ANIMAL LIVER PERFUSION IN PATIENTS WITH COMA COMPLICATING VIRAL HEPATITIS. (Pol.) Kassur, B. (Med. Acad. Inst. Intern. Dis., Warsaw, Poland) and Z. Olejnik. *Pol. Tyg. Lek.* 26(16):582-585, 1971.

6184 ENZYME PROPHYLAXIS OF POSTTRANSFUSION HEPATITIS. (Rus.) Mazhinskaia, V. P. *Vestn. Khir.* 105(12):58-60, 1970.

See also number: 5657

CIRRHOSIS

6185 TREATMENT OF CHRONIC PORTAL-SYSTEMIC ENCEPHALOPATHY WITH LACTULOSE. REPORT OF SIX PATIENTS AND REVIEW OF THE LITERATURE. (E.) Bircher, J. (Inst. Clin. Pharmacol., Bern, Switzerland), U. P. Haemmerli, G. Scollo-Lavizzari and K. Hoffmann. *Am. J. Med.* 51(2):148-159, 1971.

Six patients with advanced cirrhosis of the liver complicated by chronic portal systemic encephalopathy were treated by feeding the nonabsorbable disaccharide lactulose (1,3-ß-galactosidofructose) in doses large enough to produce a mild artificial disaccharide malabsorption syndrome. There was a appreciable difference between the clinical effects of neomycin and lactulose. In all cases the dietary protein intake was increased from the initial 40 g/day to between 70 and 100 g/day during a second lactulose period without any signs of deterioration. Fasting arterial and venous blood ammonia determinations, elevated (1.53-2.66 μg/g) during laxative treatment, were in the normal range with either neomycin or lactulose. Diarrhea, a major side-effect of lactulose treatment, was not a problem when the administered doses were patient-adjusted. Reports in the literature indicate that successful treatment of portal-systemic encephalopathy with lactulose has occurred in 95 of 114 patients (83%). The lowered blood ammonia levels during treatment indicate that ammonia absorption from the colon may be decreased under lactulose treatment.

6186 THE MECHANISM OF ACTION OF LACTULOSE IN PORTAL-SYSTEMIC ENCEPHALOPATHY. NON-IONIC DIFFUSION OF AMMONIA IN THE CANINE COLON. (E.) Bircher, J. (U. Bern Inst. Clin. Pharmacol., Switzerland), U. P. Haemmerli, E. Trabert, F. Largiader and T. Mocetti. *Rev. Eur. Etud. Clin. Biol.* 16(4):352-357, 1971.

The nonionic ammonia diffusion treatment was measured by the colonic vein and colonic luminal concentration of ammonia and the pH in 6 dogs with surgically prepared fistulas before and after lactulose treatment. Colonic venous ammonia concentrations were lower in all lactulose treated dogs as compared to controls, while all experiments showed a positive correlation between fecal and venous ammonia concentrations. The correlation coefficient (r=0.67) was rather low. Ammonia diffusion across the colon membrane was pH dependent so that lowering fecal pH caused a reversal of the ratio of free ammonia concentrations which determines ammonia fluxes. These results seemingly imply that at the fecal pH of normal conditions the colon is a site for ammonia absorption, whereas, below this pH (under lactulose treatment) the colon serves as a site of ammonia excretion. This may explain the beneficial action of lactulose in portal-systemic encephalopathy by the acidification of colonic contents on nonionic ammonia diffusion across its mucosa.

6187 CAVAL VEIN THROMBOSIS IN LIVER CIRRHOSIS (OBSERVATIONS MADE IN 21 CASES). (Gr.) Sakellaridis, D. A. (59 Hermou St., Salonica, Greece). *Hellen. Iatr.* 40(2): 156-162, 1971.

A study of 21 patients (15 males and 6 females; 17-82 yr old) with cirrhosis and portal vein thrombosis, identified among a total of 236 cirrhotic patients hospitalized for portacaval shunt, revealed that the prognosis of such cases is extremely poor. Symptomatology was no different than in ordinary cirrhosis. Three patients died from hepatic insufficiency, 12 subsequent to rupture of esophageal varices, 2 postsurgically and 1 from other causes; one patient was lost to follow-up. The other 2 patients were in good condition 2-3 yr following portacaval shunt.

6188 THE RELIABILITY OF DEATH CERTIFICATION OF CIRRHOSIS. (E.) Duffy, G. J. (St. Luke's Hosp., Dublin, Ireland) and G. Dean. *J. Ir. Med. Assoc.* 64(417):393-397, 1971.

The certified incidence of cirrhosis in Ireland has been established at 2.1 per 1000 deaths. An incidence of 7.6 per 1000 deaths was reported at autopsy. However, the autopsies were selective, and a true incidence of 3.8 per 1000 deaths indicated that Ireland has a low mortality from cirrhosis. By contrast, high admission rates to mental hospitals suggest that in Ireland either the toxic effects of alcohol produce cerebral dysfunction rather than hepatic damage or that the frequency of alcoholism is higher in the psychologically disturbed.

6189 THE EPIDEMIOLOGY OF ALCOHOLIC CIRRHOSIS IN TWO SOUTHWESTERN INDIAN TRIBES.

(E.) Kunitz, S. J. (U. Rochester Sch. Med., N..Y.), J. E. Levy, C. L. Odoroff and J. Bollinger. *Q. J. Stud. Alcohol* 32(3A):706-720, 1971.

Data on liver cirrhosis among the Hopi and the Navaho Indians during the period 1965-1967 were reviewed and compared between tribes and with national statistics. The mortality rate of 25 Hopi cirrhotics was 40% (10 patients) and 19% (17 patients) for 81 Navaho cirrhotics. No differences were observed between the marital status of cirrhotic patients between tribes or with the general population. Among the Hopi, most of the cirrhosis cases were from off-reservation rather than from traditional villages or from on-reservation wage-work communities. Among the Navaho, fewer cases came from isolated areas and the incidence increased in areas closer to off-reservation communities. The age-adjusted death rates (2 yr or more) from all types of cirrhosis per 100,000 population were 19.9 in the general population, 13.0-17.0 in Navaho and 104.0 in the Hopi. Thus, cirrhosis death rates among the Hopi Indians were over 4 times higher than in the general U.S. population. These differences may be due to different drinking patterns rather than acculturation stress.

6190 THORACIC TRANSPOSITION OF THE SPLEEN FOR PORTAL HYPERTENSION. A CLINICAL AND EXPERIMENTAL INVESTIGATION.

(E.) Hästbacka, J. (Univ. Cent. Hosp., Helsinki). *Ann. Chir. Gynaecol. Fenn.* 60(Suppl. 176):1-77, 1971.

The effects and complications of thoracic transposition of the spleen in the treatment of portal hypertension was studied experimentally (78 dogs) and clinically (26 with cirrhosis, 11 with portal thrombosis). In all dogs and in 11 patients, splenic transposition was combined with a resection by a technique based on the segmental organization of the vasculature of the spleen. In dogs, spleno-thoracic collaterals which connected the portal and caval veins were demonstrable venographically within a week of transposition. Obstruction of the portal vein producing portal congestion did not cause occlusion of the lienal vein or its collaterals after secondary ligation of the lienal artery. Thrombosis of the lienal vein and portal hypertension almost always followed primary splenic dearterialization. Following the transposition in dogs, abundant venous communications were formed after gradual lienal artery obstruction. In the 37 patients, transposition of the spleen into the thoracic cavity did not cause any significant impairment of liver or respiratory function, while it did relieve thrombocytopenia. The lienal vein remained patent and established collaterals with the caval vein when the lienal artery was not ligated at transposition. No esophageal rebleeding was seen in 67% of the patients 6 months after surgery, but late recurrences were fatal in 2 cases. In 40% of the patients, esophageal varices were either diminished or completely decompressed. The primary disadvantage of splenic transposition seemed to be the high risk of early bleeding recurrence, however, supplementary procedures involving the esophageal varices reduced the incidence of recurrent bleeding. In 11 patients in whom the lienal artery was ligated at reoperation, there was remission of thrombocytopenia, decreased portal pressure and increased portal decompression capacity of the collateral venous supply which developed after the initial operation. Thus, this secondary procedure reduced the possibility of esophageal rebleeding. The small operative risk, the absence of significant late complications, and the success of this procedure in alleviating many problems associated with portal hypertension indicate the usefulness of splenic transposition.

6191 GLUCOSE TOLERANCE IN CIRRHOSIS OF THE LIVER.

(E.) Středa, M. (Charles U. Med. Fac., Prague). *Acta Univ. Carol.* [*Med.*] *(Praha)* 16(3-4):317-323, 1970.

The effect of age and corticoids on glucose tolerance was investigated in patients with cirrhosis. Glucose tolerance (studied by means of glucose and hydrocortisone glucose tolerance tests) declined with increasing age especially after hydrocortisone premedication. The highest tendency for the blood sugar elevation was at 90, 60 and 120 min values after the intake of glucose in the hydrocortisone glucose tolerance test. In cirrhotics over 40 yr old in comparison to healthy subjects and cirrhotics under 40, the blood sugar increase, after glucose intake, was higher and lasted longer. The above was also seen following i.v. glucose administration as well as after the tolbutamide test.

6192 EXPERIMENTAL MODELS FOR STUDYING CHRONIC LIVER DISEASE. CHANGES IN THE HEPATIC AND GENERAL RETICULOENDOTHELIAL SYSTEM DURING CIRRHOGENOUS LIVER DISEASES.

(Fr.) Laky, D. (Fundeni Hosp. Clin., Bucharest, Rumania), L. Golgotiu and M. Quintesco. *Virchows Arch.* [*Pathol. Anat.*] 353(1):45-59, 1971.

Cirrhosis was induced in albino rats by 5 different methods: (1) inhalation of CCl_4, (2) incomplete ligation of the common bile duct, (3) incomplete ligation of the common bile duct associated with splenectomy, (4) incomplete ligation of the hepatic artery, portal vein, and bile duct in the hepatic pedicle, and (5) incomplete ligation of the portal vein. Cirrhosis developed most rapidly in groups (3) and (5). Similar changes in the reticuloendothelial system in the spleen, lymph nodes, and bone marrow were found in all 5 groups although the extent of these changes differed. Increases in the number of plasmacytes and reticulum cells and vascular changes similar to those found in collagen diseases suggest that a general immunological mechanism is involved in the etiology of cirrhosis. Cirrhosis was more severe and developed earlier in group (3) than in group (2), indicating that the spleen is involved in the development of hepatic necrosis.

6193 RENAL AND INTRARENAL BLOOD-FLOW IN CIRRHOSIS OF THE LIVER. (E.) Kew, M. C. (Roy. Free Hosp., London), R. R. Varma, H. S. Williams, P. W. Brunt, K. J. Hourigan and S. Sherlock. *Lancet* 2(7723):504-510, 1971.

Renal circulation was studied in 33 patients with cirrhosis using the Xenon washout technique. Most patients demonstrated reduced renal blood flow (verified by gamma-camera nephrogram) which involved a decreased distribution to and flow rate through the outer cortex while medullary and juxtamedullary flow remained normal. Creatinine clearance was maintained with slight or moderate cortical blood flow, whereas low cortical perfusion was always associated with low glomerular filtration rates. Renal blood flow changes were observed in patients with well-compensated cirrhosis. However, no correlation between renal blood flow, liver function or the activity of the liver disease could be demonstrated. These renal circulatory changes may explain why cirrhotic patients with normal blood urea readily develop oliguric renal failure following slight decreases in circulating blood volume or moderate shifts of fluid within the body compartments.

6194 STUDY OF SERUM COPPER AND COPPER OXIDASE IN PATIENTS WITH INDIAN CHILDHOOD CIRRHOSIS. (E.) Kapoor, S. K. (All-India Inst. Med. Sci., New Delhi), M. Singh and O. P. Ghai. *Indian J. Med. Res.* 59(1):115-121, 1971.

Subjects consisted of 30 patients each with Indian childhood cirrhosis, hepatomegaly due to other causes and normals. In normal children the mean serum levels of copper and copper oxidase were 119.3 μg and 0.38 optical density U/100 ml, resp. Essentially identical mean levels were found in the patients with Indian childhood cirrhosis (241.4 and 0.70) and in those with hepatomegaly of other etiology (223.1 and 0.67), and both parameters in both groups were significantly higher than those in normal controls. The extent of hepatic dysfunction was found to correlate highly positively with the serum copper levels. None of 10 patients with Indian childhood cirrhosis subjected to slit-lamp microscopy showed any evidence of the Kayser-Fleisher ring characteristic of hepatolenticular degeneration. It is suggested that the elevated copper levels in the patients with liver disease results from the primary hepatic insult instead of causing it.

6195 NODULAR SYMMETRICAL LIPOMATOSIS AND CIRRHOSIS OF THE LIVER. (E.) Heller, R. F., I. A. Alavi and G. Dunea (Cook County Hosp., Chicago, Ill.). *Am. J. Dig. Dis.* 16(4): 333-336, 1971.

Three patients with multiple nodular encapsulated lipomatosis and cirrhosis of the liver are presented. The patients' symptoms best fit the syndrome of nodular symmetrical lipomatosis. The absence of family history is somewhat unusual, and the association with alcoholism and cirrhosis has not been described. In a review of 225 patients with cirrhosis of the liver, none had a lipoma. Total lipid, phospholipid, and cholesterol levels were normal in these 3 patients as they were in most previously recorded cases.

6196 PORTAL HYPERTENSION. DISTAL SPLENORENAL SHUNT. WARREN'S OPERATION. (Sp.) Delgado, B. (Sch. Med., Montevideo, Uruguay), R. Praderi and R. Nin Sacarelo. *Cir. Uruguay* 40(3): 258-261, 1970.

6197 MYOCARDIAL ABSCESS DURING PROBABLE STAPHYLOCOCCAL SEPTICEMIA COMPLICATING LIVER CIRRHOSIS. (Fr.) Pequignot, H. (Cochin Hosp., Paris), P. Delavierre, J. L. Portos and J. P. Harpey. *Sem. Hop. Paris* 47(18):1142-1143, 1971.

6198 PORTAL HYPERTENSION SYNDROME. SYNTHESIS OF PATHOPHYSIOLOGY. CLINICAL FEATURES AND THERAPY. (Sp.) Giuliano, A. *Bol. Soc. Cir. Ros.* 37(1-2-3):115-127, 1970.

6199 CANCER WITH CIRRHOSIS IN CHILDHOOD. (Ger.) Griss, P. (U. Heidelberg Inst. Gen. Pathol., Germany) and U. Schulz. *Acta Hepatosplenol. (Stuttg.)* 18(4):262-273, 1971.

6200 COMPARATIVE STUDY OF FATTY LIVERS OF VARIOUS STAGES AND ETIOLOGY WITH A VIEW TO CLINICAL AND FUNCTIONAL DIAGNOSIS. (Ger.) Rosch, D. (City Hosp., Schwabisch Gmund, Germany) and J. Weise. *Acta Hepatosplenol. (Stuttg.)* 18(2):104-119, 1971.

6201 ASCITES AND PORTAL VEIN HYPERTENSION. OPERATIVE TREATMENT BY DRAINAGE OF THE THORACIC DUCT INTO THE INTERNAL JUGULAR VEIN. (Ger.) Raschke, E. (Univ. Surg. Clin., Bonn, Germany). *Fortschr. Med.* 89(5):197-199, 1971.

6202 EFFECT OF LYSINE ON THE HYPERAMMONEMIA OF THE HEPATIC CIRRHOSIS PATIENT. (Fr.) Lemonnier, F. (St. Antoine's Hosp., Paris), G. Goutand and J. Caroli. *Presse Med.* 79(23): 1063-1066, 1971.

6203 PARTIAL SYMPATHOTOMY OF THE PORTACAVAL SYSTEM IN PORTAL HYPERTENSION. (Rus.) Efimishin, N. S. *Vestn. Khir.* 106(2):132-136, 1971.

6204 DISPUTABLE PROBLEMS IN THE SURGICAL TREATMENT OF PORTAL HYPERTENSION. (Rus.) Lidskii, A. T. *Vestn. Khir.* 106(2): 126-132, 1971.

6205 PROPHYLACTIC SPLENORENAL VENOUS ANASTOMOSIS IN PATIENTS WITH HEPATIC CIRRHOSIS AND PORTAL HYPERTENSION. (Rus.) Litkin, M. I. and V. V. Simonov. *Vestn. Khir.* 106(1):30-34, 1971.

6206 THE SIGNIFICANCE OF SERUM ALANINE AND LYSINE LEVELS IN CIRRHOSIS OF THE LIVER. (Rum.) Panaitescu, G. (Brincovenesc, Hosp., Bucharest, Rumania), B. Fica and G. Grigorescu. *Viata Med.* 18(4):157-160, 1971.

6207 THE VALUE OF ENDOSCOPY IN THE MANAGEMENT OF THE PATIENT WITH LIVER CIRRHOSIS. (E.) Dagradi, A. E. (VA Hosp., Long Beach, Calif.), B. Ahmadi and S. J. Stempien. *Am. J. Gastroenterol.* 56(1):44-47, 1971.

6208 CRITICAL STUDY OF 211 PATIENTS WITH STENOSIS OF ODDI'S SPHINCTER. (Fr.) Salembier, Y. *Lille Med.* 16(3):405-414, 1971.

Of 3000 patients who underwent biliary tract surgery, 211 had stenosis of Oddi's sphincter. These included 3 patients with isolated odditis, 1 patient with odditis as a complication of cholecystectomy, and 13 patients with odditis and nonlithiasic cholecystitis; the remaining 194 patients had gallstones. Of 89 patients with cholecystolithiasis and odditis, 49 had a history of biliary obstruction. Good results with no recurrences of biliary obstruction were obtained by combining cholecystectomy with sphincterotomies in 25 cases and with biliodigestive anastomoses in 8 cases. Odditis, present in 89 patients with choledocholithiasis, was associated with signs of biliary obstruction in 76 patients. Sphincterotomies were performed in 43 cases, choledochoduodenostomies in 5 cases, and a choledochojejunostomy in 1 case; 3 of these patients developed odditis 1-8 yr after surgery for choledocholithiasis. In 14 patients odditis developed immediately after to 8 yr after cholecystectomy. Surgery (8 sphincterotomies and 2 biliodigestive anastomoses), which was performed 18 months to 26 yr after the original operation, gave good results in 10 of the 12 patients who were followed. Odditis was associated with reactive pancreatitis in 7 patients. These consisted of 5 who were undergoing cholecystectomy and 2 who were undergoing surgery for the complications of cholecystectomy.

6209 THE SURGICAL SIGNIFICANCE OF CARCINOMA OF THE GALLBLADDER. (E.) Pemberton, L. B. (Med. Ctr., Columbus, Ga.), W. F. Diffenbaugh and E. L. Strohl. *Am. J. Surg.* 122(3):381-383, 1971.

The courses of 41 patients with gallbladder carcinoma from 1959-1969 were reviewed and added to 59 cases that had previously been reported. The correct preoperative diagnosis was made in only 5 patients, the patient's symptoms often simulating abdominal problems (hiatal hernia, duodenal ulcer and appendicitis). These patients had few characteristics that were diagnostic of gallbladder carcinoma. Jaundice, weight loss and anemia occurred in 35, 51 and 44% of the patients. Severe, constant epigastric pain, reported as characteristic of the disease, was present in 44 patients whereas 20 patients had little or no pain. A total of 20% of 41 recent patients presented with ascites, indicative of intraperitoneal spread and 10% presented with duodenal obstruction secondary to direct extension of the carcinoma. Gallstones were associated with the tumor in 78%. Eight of 38 patients who underwent cholecystectomy have survived for more than 2 yr. The usual cause of death was respiratory failure followed by cardiac arrest. Although radical surgical extirpation is not recommended, limited wedge resection of the liver and excision of biliary lymph nodes may have some merit.

6210 PREVALENCE OF GALLBLADDER DISEASE AMONG CHIPPEWA INDIANS. (E.) Thistle, J. L. (Mayo Grad. Sch. Med., Rochester, Minn.), K. L. Eckhart, Jr., R. E. Nensel, F. T. Nobrega, G. G. Poehling, M. Reimer and L. J. Schoenfield. *Mayo Clin. Proc.* 46(9):603-608, 1971.

Prevalence of biliary tract disease was studied in 4,724 Chippewa Indians from Minnesota's Leech Lake Reservation. In patients 20 yr old or older, the prevalence rate for males was 4% and for females 15%. For all Indians over 20, the prevalence rate was 8.8%. The greatest prevalence rate for men (16%) was noted for men over 70 while for women, the highest rates (26-29%) was noted in the group 40 yr old and older. Furthermore, in each age group other than those in the range 0-9 yr, women had a significantly higher prevalence rate than men and 57% of these women were diagnosed as having gallbladder disease before the age of 40. Pregnancy was associated with a higher prevalence (20%) of gallbladder disease than that for nonpregnant women (1.8%) and was most apparent in women less than 30. While the prevalence of disease was greater (19%) in women with more Indian heritage than women with less heritage (10.3%), no correlation was found with Indian men. A higher prevalence of gallbladder disease was found in Chippewa Indians than other groups of American Indians and was significantly higher in both males and females as compared to the previously reported study of Framingham Caucasians.

6211 ACALCULOUS CHOLESTEROSIS OF THE GALLBLADDER. (E.) Andersson, A. (U. Umea Dept. Surg., Sweden) and L. Bergdahl. *Arch. Surg.* 103(3):342-344, 1971.

A review of 3600 cholecystectomies revealed 18 cases of cholesterosis without stones. Six of these cases (33%) had either a history of jaundice or currently diagnosed jaundice. There are several theories as to the genesis of this jaundice; mild hepatitis, cholangitis, pancreatitis, detached polyps from the mucous membrane of the gallbladder only or in conjuction with spasm of the sphincter of Oddi, and spontaneous passage of calculi. Three case histories are presented in support of the latter theory. In each case calculi could have occurred and caused jaundice even though no stones were noted at the time of surgery.

6212 TERPENES IN THE TREATMENT OF GALLSTONES. (E.) Hordinsky, B. Z. (Drake, N. Dak.). *Minn. Med.* 54(8):649-652, 1971.

Subjects consisted of 151 patients with gallstones who received Rowachol (2 drops 4 times a day).

This proposed choleretic is a proprietary combination of volatile oils including: menthol, 32%; menthone, 6%; pinene, 17%; borneol, 5%; camphene, 5%; cineol, 2%; and olive oil. Cholecystography was performed before treatment and after 3 and 6 months of Rowachol treatment. During this period, no patient showed any alterations of liver function tests, blood count or urinalysis. No clinical response was seen in 147, while 4 showed apparent dissolution of their gallstones, usually within 3 months.

6213 A HISTOCHEMICAL STUDY OF THE BILE DUCTS IN LONG-TERM BILIARY OBSTRUCTION IN THE RAT. (E.) Chou, S. T. (U. Hong Kong Dept. Pathol.) and J. B. Gibson. *J. Pathol.* 103(3):163-175, 1971.

The effects of experimental ligation of the common bile duct, the causes of resultant liver-cell damage, the causes of the focal Charcot-Gombault necrosis, and the differences in extra- and intrahepatic obstruction were investigated. The liver and bile duct of 50 rats were examined by histochemical methods up to 60 days after ligation of the common bile duct. Ischemia due to reduction of portal-venous blood supply resulted in atrophy of liver cells. Proliferation of normal epithelium from the interlobular bile ducts gradually replaced atrophied liver cells. This proliferation was ascribed to a stimulus to hyperplasia exerted on the whole liver and induced by liver cell atrophy. Arterial blood supply to the rat bile ducts was sufficient to support hyperplasia. Foci of adenocystic fibrosis occurred, the cells of which contained no mucin. Serum and bile alkaline phosphatase elevation were found after 4 weeks of obstruction when biliary epithelial hyperplasia was greatest suggesting that bile-duct epithelium may produce this enzyme.

6214 SURGICAL TREATMENT OF IDIOPATHIC DILATATION OF THE COMMON BILE DUCT (CHOLEDOCHAL CYST) IN 14 CHILDREN. (E.) Duckett, J. (Child. Hosp., Philadelphia, Pa.), A. J. Eraklis and L. Longino. *J. Pediatr. Surg.* 6(4): 421-426, 1971.

Fourteen children, 7 days to 14 yr of age were treated for choledochal cysts. The possible etiology of the cyst is discussed. Early recognition of the defect and prompt repair by a wide anastomosis between the duodenum and the most dependent portion of the cyst was advised. In the 12 patients who were followed from 2 to 19 yr there was no evidence of ascending cholangitis or need for additional surgery. Surgery was delayed in the other 2 patients thought to have hepatitis. These 2 patients developed serious biliary cirrhosis; 1 child died of cholangitis.

6215 BILIARY DUCT STONE FORMATION. (E.) ORDA, R. (Tel-Aviv U. Med. Sch., Tel-Hashomer, Israel) and H. Nathan. *Surgery* 70(3):375-377, 1971.

Casts were made of gallbladders and extrahepatic biliary ducts taken from 30 autopsy cases to study the possibility of stone formation outside the gallbladder. A clear pattern of eminences was easily discernible on the outer surface of each plastic cast, corresponding to the small niches or crypts present on the inner surface of the gallbladder, as well as in the hepatic, cystic, and common bile ducts. The crypts were generally smaller than 1 mm with a depth between 1 and 2 mm. There were fewer eminences in the ducts and they were isolated and scattered on the surface. The surface of the ducts, between the different eminences, was smooth in contrast to that of the gallbladder, where the entire surface was covered by the eminences. The observed crypts on the duct surfaces may be a predisposing factor in local lithogenesis.

6216 THE USE OF MEDIUM-CHAIN TRIGLYCERIDES IN THE MANAGEMENT OF BILIARY ATRESIA. (E.) Cohen, M. I. (Montefiore Hosp. Med. Ctr., Bronx, N. Y.) and L. M. Gartner. *J. Pediatr.* 79(3):379-384, 1971.

Use of a medium-chain length triglyceride (MCT) dietary formula in 11 children with biliary atresia caused reduction in fecal fat losses, enhanced growth, and improvement in intestinal patterns. Management of patients with biliary atresia to prevent growth retardation and undernourishment resulting from fat malabsorption due to bile salt exclusion from intestine was improved using dietary MCT with chain lengths of 8-12 carbon atoms. In 3 cases with existing growth failure the MCT diet allowed catch-up growth, while initiation of MCT diet early in 3 infants permitted a normal growth pattern. No adverse reactions were noted.

6217 ABSORPTION OF ORGANIC COMPOUNDS BY THE INJURED GALLBLADDER. (E.) Ostrow, J. D. (VA Hosp., Philadelphia, Pa.). *J. Lab. Clin. Med.* 78(2):255-264, 1971.

The effects of natural and experimentally-induced cholecystitis on the absorption of organic anions by the isolated, in situ gallbladder was studied in guinea pigs. Each chronically inflamed gallbladder (spontaneous cholelithiasis with chronic cholecystitis) showed diminished permeability, whether the instilled compound was normally readily or poorly absorbed. Those animals with spontaneous acute cholcystitis showed no variation in the absorption of unconjugated bilirubin. However, permeability to substances which were normally poorly absorbed was uniformly strikingly increased (taurocholate, BSP, iodipamide). Bile salts caused mucosal injury ranging from multifocal flattening of the epithelium with loss of the brush border in some cells, to hemorrhagic slough of the mucosa, with marked acute inflammatory changes in the muscularis. Injury was more severe with unconjugated than with conjugated bile salts. For any given bile salt, the degree of injury was greater at high concentrations or with longer durations of exposure. Addition of 0.08 mM bilirubin diminished the toxicity of the instilled bile salt solution. Mucosal changes following deoxycholate and bilirubin administration resembled acute cholecystitis, and absorption studies on these gallbladders revealed no alteration in unconjugated bilirubin uptake but a marked acceleration in taurocholate absorption.

6218 FORMATION AND METABOLISM OF BILE ACIDS IN EXTRAHEPATIC BILIARY ATRESIA. (E.) Norman, A. (Danderyd Hosp., Sweden) and B. Strandvik. *J. Lab. Clin. Med.* 78(2):181-193, 1971.

The conversion of cholesterol-4 ^{14}C into bile acids and the metabolism of cholic acid-24-^{14}C and chenodeoxycholic acid-24-^{14}C in infants with extrahepatic biliary atresia was investigated. Approximately 15% of parentally administered cholesterol-4-^{14}C was excreted within 17 days, between 15-45% of total daily isotope excretion occurring with the feces as neutral steroids, mainly cholesterol. The isotope in urine consisted of labelled bile acids, mainly cholic and chenodeoxycholic acid. A rapid excretion of cholic acid-24-^{14}C was observed and 55-77% of administered isotope was excreted in urine during the first 4 days after injection. On the other hand, only 15 and 17% of administered chenodeoxycholic acid-24-^{14}C was excreted in urine during 4 days after injection. Following simultaneous administration of cholic and chenodeoxycholic acid, almost all of the isotope was absorbed, as only 3% was recovered from feces. In biliary atresia, cholic acid was found to be a metabolic end product, and less than 5% of chenodeoxycholic acid was found to be metabolized further.

6219 GALLBLADDER DISEASE BELOW THE AGE OF 21 YEARS. (E.) Calabrese, C (Albert Einstein Coll. Med., Bronx, N. Y.) and D. M. Pearlman. *Surgery* 70(3):413-415, 1971.

The records of 33 patients who underwent cholecystectomy for cholelithiasis before the age of 21 yr were reviewed. The patients represented 5.3% of the 620 cholecystectomies performed between 1963 and 1969. All 33 patients were girls, and of the 32 for whom information concerning parity was present, 27 (84.4%) had become pregnant before the onset of cholecystitis symptoms. An oral cholecystogram was performed in 31 patients revealing stones in 21 patients, nonvisualization of the gallbladder in 9, and faint visualization after 4 days in 1. There were no deaths in this series and only 1 complication, a s.c. wound infection. Cholecystectomy is seemingly a safe procedure with a minimal morbidity rate in this low-risk group.

6220 SCANNING ELECTRON MICROSCOPIC STUDY OF CHOLESTEROL GALLSTONES. (E.) Ogata, T. (Okayama U. Med. Sch., Japan) and F. Murata. *Tohoku J. Exp. Med.* 104(1):25-44, 1971.

Precise observations were made on the surface and fracture plane of cholesterol gallstones using a scanning electron microscope. The fracture plane appeared as a sheet of plate-like layers arranged in radiating form with the growth of crystals being irregular and tending toward increased dendritic growth toward the serrated edge. Some parts of the crystal which developed straight from the center changed their direction at an angle of about 25°, while the other parts kept the original direction. The nuclear portion was filled with very small foliate cholesterine crystals that were mixed up and loosely joined. In some stones, slate-like crystals shaped in parallelogram blocks with obtuse angles of 120°, which consisted of finely multilayered crystal sheets, were arranged over the surface. Smaller crystals seemed to develop from a large base one. Spiral growth was often observed on the surface of cholesterol crystals which were composed of lamellae of about 200 Å thickness. Cholesterol gallstones seem to develop from the center to the periphery.

6221 THE INCIDENCE OF CHOLELITHIASIS IN SICKLE CELL DISEASE. (E.) Phillips, J. C. (U. Tennessee Dept. Radiol., Memphis) and B. E. Gerald. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):27-28, 1971.

Thirty-five patients with homozygous sickle cell disease were studied to establish the incidence of cholelithiasis. Cholelithiasis incidence increases in patients with sickle cell disease above age 10 rising from 17% in the 10-19 age group to 62% during the third decade and to 71% in those 30 or older. Abdominal pain due to sickle cell crisis is common in sickle cell disease which may be indistinguishable from cholecystitis. Results indicate that all patients above 10 yr of age with sickle cell disease would benefit from routine oral cholecystography.

6222 ACUTE EMPHYSEMATOUS CHOLECYSTITIS. (E.) May, R. E. (Frenchay Hosp., Bristol, England) and R. Strong. *Br. J. Surg.* 58(6):453-458, 1971.

Three cases of acute emphysematous cholecystitis, characterized by severe inflammation of the gallbladder with production of gas within the lumen and frequently concomitant pericholecystic infiltration of gas, were presented. Clinically, the condition is of sudden onset as in biliary colic and is preceded with fever and intense right subcostal pain. The diagnosis of acute emphysematous cholecystitis was made radiologically. A straight radiograph of the abdomen will show an area of gas in the gallbladder region. The gallbladder may appear delineated by a thin halo of translucency surrounding the main shadow and in advanced cases gas may be demonstrated outside the gallbladder in the surrounding tissues. It is important to exclude other sources of gas in the biliary system such as spontaneous biliary-enteric fistulas or previous cholecystoenterostomies. A detailed histological examination of the 3 resected gallbladders revealed narrowing of the blood vessels in the wall of the organs by cellular fibrous tissue. Acute emphysematous cholecystitis may be the result of a primary vascular occlusion of the cystic artery or its branches. Cholecystectomy and concomitant chemotherapy is the treatment of choice.

6223 CHOLANGIOHEPATITIS AND SECONDARY BILIARY CIRRHOSIS IN GALLBLADDER DISEASES. (Ger.) Reichmann, J. (Karl Marx U. Surg. Clin., Leipzig, Germany) and B. Wohlgemuth. *Zentralbl. Chir.* 96(17):572-580, 1971.

Needle biopsy of the liver performed in 596 patients at the start of gallbladder surgery revealed 92 cases of liver damage (85 cholangiohepatitis, 7 secondary cirrhosis) resulting directly from the primary biliary disease. In only half of these patients was liver damage indicated by chemical laboratory methods. It is suggested that persurgical liver biopsy, in addition to cholangiography and radiomanometry is an essential factor for reduction of late postcholecystectomy symptoms.

6224 BILIARY ILEUS. (Sp.) Mir Pallardo, J. (La Fe Social Security City Sanitar., Valencia, Spain), M. Muñoz Ibañez, P. Sendra Leon and S. Gomez Iglesias. *Rev. Esp. Enferm. Apar. Dig.* 35(1):69-76, 1971.

6225 SURGICAL LESIONS OF THE COMMON BILE DUCT. PERSONAL EXPERIENCE. (Sp.) Longo, O. F. (San Roque Hosp., Cordoba, Argentina), L. A. Mammana, J. D'Agostino, C. D. Huarte and C. Nani. *Rev. Esp. Enferm. Apar. Dig.* 34(6): 587-594, 1971.

6226 ADENOMYOMATOSIS OF THE BLADDER AND ITS RELATION TO BENIGN STENOSIS OF THE TERMINAL BILE DUCT. (Sp.) Pera, C. (U. Barcelona Sch. Med., Spain), L. Fernandez-Cruz and J. Vila. *Rev. Esp. Enferm. Apar. Dig.* 34(6):569-586, 1971.

6227 COMPLEX HEPATOBILIARY MALFORMATION. MALFORMATION OF THE LEFT LOBE OF THE LIVER WITH AGENESIS OF THE GALLBLADDER, CYSTIC DUCT, AND COMMON BILE DUCT. (Sp.) Barreiro Alvarez, F. (La Paz Resid. Madrid), A. Mateo Martinez, M. Lazaro Lazaro and J. Lozano. *Rev. Esp. Enferm. Apar. Dig.* 34(6):657-666, 1971.

6228 A CASE OF CONGENITAL DIVERTICULUM OF THE COMMON BILE DUCT. (Por.) Iuchtman, M. (Bonsucesso Hosp., Rio de Janeiro, Brazil), M. S. Martins and R. E. Scheidemantel. *Folha Med.* 61(4):297-300), 1970.

6229 SPONTANEOUS DUODENOBILIARY REFLUX IN THE ABSENCE OF A GASTROINTESTINAL BILIARY FISTULA. (Rum.) Firica, T. (Colentina Hosp., Bucharest, Rumania) and V. Gradinaru. *Chirurgia (Bucur.)* 20(3):193-200), 1971.

6230 CHOLECYSTITIS AND CHOLELITHIASIS IN CHILDREN. ABNORMALITIES OF THE CYSTIC DUCT. ROLE OF THE BLOOD GROUP IN THE PROBABILITY OF OCCURRENCE. (Fr.) Aboulola, M. (CHU Pediatr. Sug. Clin., Algiers, Algeria), H. Lahreche, R. Bouayad Agha and M. Bekkat. *Ann. Chir. Infant.* 12(1):53-58, 1971.

6231 AMMONIA METABOLISM IN EXTRAHEPATIC BILIARY ATRESIA. (E.) Rubaltelli, F. F. (U. Padua Pediatr. Clin., Italy) and P. A. Formentin. *Biol. Neonate (Basel)* 17(3-4):317-320, 1971.

6232 A CASE OF ASCARIASIS OF THE COMMON BILE DUCT. (Fr.) Borde, J. (CHU Pediatr. Surg. Clin., Rouen, France), P. Mitrofanoff and P. Wallon. *Ann. Chir. Infant.* 12(1):39-46, 1971.

6233 THOROTRASTOSIS, OBSTRUCTIVE JAUNDICE ASSOCIATED WITH BILE DUCT CARCINOMA (ADENOCARCINOMA) IN A THOROTRAST ACCUMULATION. (Ger.) Eisenburg, J. (Univ. Munich 1st Med. Clin., Germany). *Fortschr. Med.* 89(15):639-640, 1971.

6234 DIAGNOSIS AND TREATMENT OF BENIGN BILIARY TRACT STRICTURE. (E.) Warren, K. W. and F. F. Whitcomb, Jr. *Hosp. Pract.* 6(2):62-74, 1971.

6235 THE POSTCHOLECYSTECTOMY SYNDROME. (Ger.) Koelsch, K. A. (Reg. Hosp., Magdeburg Altstadt, Germany). *Internist. Prax.* 11(1):47-57, 1971.

6236 GALLSTONE FORMATION. (E.) Bouchier, I. A. D. (Roy. Free Hosp. Med. Sch., London). *Lancet* 1(7702):711-715, 1971.

6237 RESIDUAL LITHIASIS OF THE COMMON BILE DUCT. (Pol.) Glinski, M. (Med. Acad 1st Surg. Clin., Zabrze, Poland), W. Grzywna, W.

and M. Pardela. *Pol. Przegl. Chir.* 43(1):79-82, 1971.

6238 COMPLICATIONS AFTER VERTICAL AND TRANSVERSE INCISIONS FOR CHOLECYSTECTOMY. (E.) Pemberton, L. B. (Presbyterian-St. Luke's Hosp., Chicago, Ill.) and W. G. Manax. *Surg. Gynecol. Obstet.* 132(5):892-894, 1971.

6239 CHOLELITHIC ILEUS. (Ger.) Zimmermann, K. (Justus Liebig U. Surg. Clin., Giessen, Germany) and H. R. Schoen. *Therapiewoche* 21(14):1119-1126, 1971.

6240 CARCINOMA OF THE GALLBLADDER. (E.) Rogers, L. F. (4502 Med. Drive, San Antonio, Tex.). *Tex. Med.* 67(3):69-74, 1971.

6241 SIDE-TO-SIDE CHOLEDOCHODUODENOSTOMY. A NEGLECTED PALLIATIVE PROCEDURE. (E.) Stuart, M. (Cleveland Clin. Found., Ohio) and S. O. Hoerr. *Am. J. Surg.* 121(5):504, 1971.

6242 RECURRENT COMMON BILE DUCT STONES. (Sp.) Praderi, R. (Sch. Med., Montevideo, Uruguay). *Cir. Uruguay* 40(3):199-201, 1970.

6243 HYALINE CALCINOSIS OF THE GALLBLADDER. (Sp.) Suiffet, W. (Pasteur Hosp., Montevideo, Uruguay). *Cir. Uruguay* 40(3): 229-233, 1970.

6244 SECONDARY OPERATIONS ON THE BILIARY TRACT. (Ger.) Hess, W. (Limmatquai 122-124, Zurich, Switzerland). *Diagnostik* 4(2):61-64, 1971.

6245 AMEBAE IN THE HUMAN BILIARY TRACT. (Heb.) Steinitz, H. (Zamenhof Kupat Holim Cent. Clin., Tel Aviv) and B. Talis. *Harefuah* 80(2):77-80, 1971.

6246 RADIOGRAPHIC FINDINGS AFTER TRANSDUODENAL SPHINCTERECTOMY. (Ger.) Sewcz, H. G. (U. Rostock Roentgenol. Diagn. Ctr., Germany) and C. Sewcz. *Radiol. Diagn. (Berl.)* 11(5):609-616, 1970.

6247 DISEASES OF THE GALLBLADDER IN MYOCARDIAL INFARCTION. (Rus.) Bodiug, O. F. *Ter. Arkh.* 43(4):73-77, 1971.

6248 CASE REPORT ON EXTRAHEPATIC BILE DUCT ASCARIASIS. (Ger.) Gundlach, E. (Med. Acad. Surg. Clin., Erfurt, Germany) and K. H. Mastny. *Z. Aerztl. Fortbild. (Jena)* 65(3): 161-162, 1971.

6249 CYSTIC DILATATION OF THE COMMON BILE DUCT. (Sp.) Varela, N. B. (Sch. Med., Montevideo, Uruguay) and C. A. Pravia. *Cir. Uruguay* 40(3):189-194, 1970.

6250 BILIARY OBSTRUCTION IN INFANCY. (Fr.) Beraud, C. (Debrousse Hosp., Lyon, France), J. Sauvegrain and A. Campo Paysaa. *Ann. Radiol. (Paris)* 14(1-2):115-119, 1971.

6251 CARCINOMA OF THE AMPULLA OF VATER. (E.) Ponka, J. L. (Henry Ford Hosp., Detroit, Mich.) and N. S. Uthappa. *Am. J. Surg.* 121(3):263-270, 1971.

6252 PRIMARY ADENOCARCINOMA IN CYSTIC DUCT REMNANTS. (E.) Dixon, J. A. (U. Utah Coll. Med., Salt Lake City) and C. Christensen. *Am. J. Surg.* 121(5):610-611, 1971.

6253 LACTASE DEFICIENCY IN CHRONIC DISEASE OF THE BILE TRACT. (Fr.) Mondon, M. J. *Cah. Med.* 11(3):87-90, 1971.

6254 EXPLORATION OF THE COMMON BILE DUCT. (E.) Pheils, M. T. (Repatriation Gen. Hosp., Concord, Australia) and P. T. Andersen. *Aust. NZ J. Surg.* 41(1):31-34, 1971.

6255 THE MANAGEMENT OF ACUTE CHOLECYSTITIS. (E.) Burnett, W. (U. Queensland Dept. Surg., Brisbane, Australia). *Aust. NZ J. Surg.* 41(1):25-30, 1971.

6256 DURATION OF NEOMYCIN THERAPY FOR ENTEROPATHOGENIC Escherichia coli DIARRHEAL DISEASE: A COMPARATIVE STUDY OF 113 CASES. (E.) Nelson, J. D. (U. Texas Southwestern Med. Sch., Dallas). *Pediatrics* 48(2):248-258, 1971.

It appears that the usually recommended 7 to 10-day course of neomycin therapy for E. coli diarrheal disease may be unnecessarily long and might actually prolong morbidity. A comparative study in 113 infants administered short-term versus long-term neomycin therapy (100 mg/kg/day) is presented. The infants on short-term therapy had their antibiotics discontinued when daily flourescent antibody tests and cultures were negative; therapy averaged 3 days with a range of 2-4½ days. The infants on long-term therapy received their antibiotics for 10 days without regard to test and culture results. Each group was again divided so as to have half of the patients receive their total daily dose on an 8 hr schedule and half on a 4 hr schedule. No difference in effect was noted. A total of 90% of the 113 patients had negative tests for E. coli in less than 48 hr after initiation of antibiotic therapy. Diarrhea lasted significantly longer in those patients on long-term therapy. The short-term therapy was as effective clinically and bacteriologically as the long-term therapy. There were twice as many infectious complications in the patients on the longer course of therapy.

6257 USE OF CHOLESTYRAMINE TO CONTROL DIARRHEA ASSOCIATED WITH ACQUIRED HYPOGAMMAGLOBULINEMIA. (E.) Gleich, G. J. (Mayo Clin., Rochester, Minn.) and A. F. Hofmann. *Am. J. Med.* 51(2):281-286, 1971.

A patient with acquired hypogammaglobulinemia was described whose watery diarrhea was unresponsive to either commercial γ-globulin or to fresh frozen plasma. Cholestyramine treatment (an anion exchange resin which binds bile acids) reduced fecal frequency and fluidity and was associated with a marked decrease in fecal sodium. No ova or parasites in the feces was detected. Bile acid absorption, assessed by labeling the patient's bile acid pool with cholate-^{14}C and determining the rate of fecal isotope excretion, was within normal limits. The appreciable bile concentration of ursodeoxycholic acid, which normally is present in only trace quantities in bile and feces and the high concentration of deoxycholic acid in the diarrheal stools suggested that an unusually active and/or abnormal bacterial flora was present. The presence of increased concentrations of secondary bile acids may have contributed to the diarrhea.

6258 RAISED SERUM IgM LEVELS IN NEONATAL ENDEMIC DIARRHOEA. (E.) Haider, S. A. (Moorgate Gen. Hosp., Rotherham, England). *Arch. Dis. Child.* 46(248):566-568, 1971.

Laboratory studies were performed on 25 of 44 babies with endemic diarrhea who were admitted to a special care nursery during a 4-month period. Eighteen of the 25 babies were of low birth weight and 15 were small for their age. The incidence of diarrhea was higher in those small for their age and males showed a significantly higher susceptibility to the illness. Most infants showed either a loss of weight or failure to gain weight prior to the illness, lethargy, anorexia, and frequent and watery stools. The peak incidence of symptoms developed was between the 8th and 10th day of life. No pathogenic organisms were found on viral cultures of stools and the absolute polymorphonuclear leukocyte counts done on the peripheral blood of affected cases was not significantly different than that of unaffected cases. Serum immunoglobulin M(IgM) estimations from venous blood showed that babies had IgM levels below 20 mg/100 ml serum and in 7 of 9 babies it never rose above 20 mg when repeated 5 to 10 days later. However, the babies with diarrhea generally showed serum IgM levels higher than 20 mg/100 ml serum and with a more rapid rate of rise of IgM. The diarrhea in these babies seems to be caused by some infectious agent that represents a different antigenic stimulus to the affected babies as reflected in the higher serum IgM levels of affected cases relative to unaffected ones.

6259 CHROMATOGRAPHIC ISOLATION OF SUBSTANCES STIMULATING GASTRIC SECRETION IN THE URINE OF PATIENTS WITH ZOLLINGER-ELLISON SYNDROME. (Fr.) Vatier, J. (Bichat Hosp., Paris), M. Dubrasquet, J.-P. Bader and S. Bonfils. *Clin. Chim. Acta* 33(2):365-371, 1970.

Chloroform extracts from the urine of 3 patients with Zollinger-Ellison syndrome were separated by chromatography on Sephadex G-25 columns, and fractions which stimulated gastric secretion in rats were further purified on aminoethylcellulose columns. On the basis of their UV absorption spectra, the 2 active fractions appear to be peptides differing in their content of aromatic amino acids.. One of these fractions produced an increase in gastric secretion similar to that of gastrin while the other fraction produced an earlier and more intense response. From these findings it can be hypothesized that these 2 fractions are different forms of gastrin or that one of the fractions is a substance secreted by the pancreatic tumor in Zollinger-Ellison syndrome.

6260 GAS CHROMATOGRAPHIC ANALYSIS OF URINARY TYROSINE AND PHENYLALANINE METABOLITES IN PATIENTS WITH GASTROINTESTINAL DISORDERS. (E.) van der Heiden, C. (Wilhelmina Child. Hosp., Utrecht, Netherlands), E. A. K. Wauters, D. Ketting, M.

Duran and S. K. Wadman. *Clin. Chim. Acta* 34(2): 289-296, 1971.

The urinary excretion of bacterial phenylalanine and tyrosine metabolites was measured in patients with cystic fibrosis, celiac disease, resection of the small intestine and unclassified diarrhea using gas chromatography. In all 7 patients with cystic fibrosis, 6 receiving pancreatin substitution therapy, p-hydroxyphenylacetic acid was increased while in 4 of 7 the phenylacetic acid excretion was elevated. Benzoic acid was increased in 9 out of 10 untreated cases of celiac disease and in 6 of 11 patients given a gluten-free diet for some time. Untreated patients also showed elevated levels of phenylacetic acid (7 patients), p-hydroxybenzoic acid (6) and p-hydroxyphenylacetic acid (8). Excessive excretion of all metabolites was variably seen in the 5 patients with intestinal resection. In patients with unclassified enteritis, phenylalanine metabolites were more frequently increased than tyrosine metabolites.

6261 RESISTANCE OF THE BREAST-FED INFANT TO GASTROENTERITIS. (E.) Bullen, C. L. (Luton and Dunstable Hosp., England) and A. T. Willis. *Br. Med. J.* 3(5770):338-343, 1971.

The relationship between the microbiological and physiochemical properties of the feces, and the composition of dietary intake was compared in 10 breast-fed and 21 bottle-fed infants. The predominant organism in the feces of breast-fed babies was an anaerobic lactobacillus. The feces of breast-fed infants had a much higher water content and a lower buffering capacity than those from bottle-fed infants and contained reducing and fermentable substances (probably lactose) which were absent from the feces of bottle-fed babies. Breast-fed infants received a relatively fluid feed, rich in lactose but low in phosphorus and caseinogen, which did not readily curd and traversed the small intestine rapidly, resulting in a carry-over of lactose and water into the large intestine. The ingredients and properties of breast milk which seem to provide an intestinal content favorable to both the growth of lactobacilli and the production of an acid environment may account for the resistance of breast-fed babies to gastroenteritis.

6262 AMINO ACID-HYPERTONIC GLUCOSE TREATMENT FOR INTRACTABLE DIARRHEA IN INFANTS. (E.) Keating, J. P. (Washington U. Sch. Med., St. Louis, Mo.) and J. L. Ternberg. *Am. J. Dis. Child.* 122(3):226-228, 1971.

Nine infants with intractable diarrhea, malnutrition and failure to tolerate a variety of orally given formulas were fed i.v. with a crystalline amino acid-hypertonic glucose solution from 14 to 37 days. The regimen was successful as evidenced by weight gain, relief of diarrhea and restoration of the infant's ability to thrive on oral feedings. Extravasation of the hypertonic infiltrate occurred on 2 occasions, in one case due to displacement of the catheter during flexing of the infant's trunk for lumbar puncture such that the catheter tip entered the extradural space. The hypertonic solution, here, created an osmotic gradient and further aggravated the dehydration. Hemolytic anemia and marked morphologic abnormalities of erythrocyte structure were observed in 1 infant during a period in which her serum inorganic phosphate level had fallen to 0.9 mg/100 ml. Apparently more complete utilization of the nitrogen is provided for protein synthesis when the nitrogen source is administered as crystalline amino acids than when the nitrogen is provided as a mixture of amino acids and peptides in hydrolysates.

6263 GASTROINTESTINAL FUNCTION AND RADIOGRAPHIC APPEARANCE FOLLOWING GASTROSCHISIS REPAIR. (E.) Touloukian, R. J. (Yale U. Sch. Med., New Haven, Conn.) and T. J. Spackman. *J. Pediatr. Surg.* 6(4):427-434, 1971.

Six surviving newborn infants with gastroschisis and antenatal evisceration of the entire gastrointestinal tract were treated by the technique of staged repair with silastic sheeting. Growth and development follow-up through infancy to between 17 mo and 6½ yrs of age showed normal gastrointestinal function and above the 25th percentile level for height and weight. No episode of intestinal obstruction or incomplete obstruction occurred. Some degree of nonrotation of the colon resulted from antenatal herniation of the intestine preventing mesenteric fixation. Length and mucosal surface of the small intestine was normal with the colon appearing markedly redundant and longer than normal. Shortening and severe inflammation of the eviscerated intestine were reversible following gastroschisis repair.

6264 DIPHENOXYLATE HYDROCHLORIDE (LOMOTIL) POISONING IN CHILDREN. (E.) Wheeldon, R. (Child. Hosp., Sheffield, England) and H. J. Heggarty. *Arch. Dis. Child.* 46(248):562-563, 1971.

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6266 SALMONELLA PATHOGENESIS IN GERM-FREE MICE. A BACTERIOLOGICAL AND HISTOLOGICAL STUDY. (E.) Ruitenberg, E. J. (Natl. Inst. Public Health, Utrecht, Netherlands), P. A. M. Guinee, B. C. Kruyt and J. M. Berkvens. *Br. J. Exp. Pathol.* 52(2):192-197, 1971.

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6270 THE ENDOMETRIOSES OF THE ALIMENTARY TRACT. (Por.) Varay, A. (Salpetriere Hosp., Paris) and J. Alexanian. *Medico (Porto)* 58(1016):614-617, 1971.

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6272 DIGESTIVE INTOLERANCE TO DIGITALOID COMPOUNDS. ITS TREATMENT BY MEANS OF METOCLOPRAMIDE. (REPORT ON 17 CASES). (Fr.) Pellerin, F. (Bichat Hosp., Paris). *J. Med. Chir. Prat.* 142(7):248-261, 1971.

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6274 MASSIVE GASTROINTESTINAL HEMORRHAGE. (E.) Finby, N. (St. Luke's Hosp. Ctr., New York, N. Y.) and C. F. Begg. *NY State J. Med.* 71(2):233-236, 1971.

6275 INFECTIOUS DIARRHEAS CAUSED BY ENTEROPATHOGENIC, SERUM-TYPED STRAINS OF Escherichia coli. (It.) Fornara, P. (Maggiore Carita Hosp., Novara, Italy) and M. E. Borgna. *Minerva Pediatr.* 23(10):395-420, 1971.

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6280 RAPID AND DIRECT EXAMINATION OF THE STOOLS IN ACUTE DIARRHEA OF CHILDREN. (Por.) Bearzoti, P. (Univ. Sch. Med. Sci., Campinas, Brazil) and I. Dos Reis, Jr. *Pediatr. Prat. (Sao Paulo)* 41(9-12):321-326, 1970.

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6286 MORPHOLOGY OF Entamoeba histolytica IN HAMSTER LIVER ABSCESSES. (Sp.) Trevino Garcia Manzo, N. (Natl. Med. Ctr., Mexico City, Mexico), M. De La Torre and I. Ruiz De Chavez. *Arch. Invest. Med.* 1(Suppl.):61-80, 1970.

6287 HISTOPATHOLOGICAL PECULIARITIES OF AMEBIC LESIONS. (Sp.) Aguirre Garcia, J. (Natl. Med. Ctr., Mexico City, Mexico). *Arch. Invest. Med.* 1(Suppl.):147-156, 1970.

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6289 Schistosoma mansoni: IMMUNITY IN Macaca mulatta. (E.) Maddison, S. E. (US Dept. Health Education Welfare Ctr. Dis. Control; Atlanta, Ga.), S. J. Geiger and I. G. Kagan. *Exp. Parasitol.* 29(3):463-470, 1971.

Immunity to Schistosoma mansoni was investigated in 29 rhesus monkeys. Infection with 1000 cercariae conferred complete protection to reinfection as demonstrated by failure of challenge cercariae to develop into egg-producing adults. Sensitization with extracts of adult worms by various routes failed to confer any protection against subsequent exposure. Humoral response was assayed by indirect hemagglutination, cercariae cyst reaction, and circumoval precipitation, bentonite flocculation, and complement-fixation tests. Infection or sensitization stimulated reactivity in all except the circumoval precipitation test. Skin tests and passive cutaneous anaphylaxis reactions revealed reaginic type antibody in infected monkeys. Delayed type skin reactivity was not observed. Antilymphocytic serum, cyclophosphamide, and total body irradiation failed to alter the actively acquired immunity.

6290 SMALL-INTESTINAL CELL TURNOVER IN PATIENTS WITH PARASITIC INFECTIONS. (E.) Da Costa, L. R. (Hotel Dieu Hosp., Kingston, Ontario, Canada). *Br. Med. J.* 3(5769):281-283, 1971.

Loss rates of small intestinal DNA were measured in 6 patients with Strongyloides stercoralis hyperinfestation, 4 patients with hookworm disease, and 8 normal controls. High epithelial cell turnover apparently resulted in excessive loss of endogenous substances causing malnutrition and hypoproteinaemia with S. stercoralis infestation. In addition to increased epithelial cell turnover there was a loss of absorptive surface due to the abnormal mucosa also permitting an increased loss of endogenous substances. The mean DNA loss rates were 73.9, 51.6, 58.0 and 62.2 ng atoms DNA-P/min in 4 strongyloidiasis patients having weight loss. This was higher than hookworm patients (mean 14.5, standard deviation, 7.5). The mucosal pattern was normal with no clinical evidence of malabsorption in the 4 hookworm patients. The high DNA loss rates in 2 strongyloidiasis patients fell to normal after treatment.

6291 INTESTINAL SCHISTOSOMIASIS. (E.) Rowland, H. A. K. (Hosp. Trop. Dis., London). *Gut* 12(8):663-667, 1971.

6292 VOLATILE FATTY ACID PRODUCTION BY THE ADULT LIVER FLUKE Fasciola hepatica. (E.) Lahoud, H. (U. New South Wales Sch. Wool Pastoral. Sci., Kensington, Australia), R. K. Prichard, W. R. McManus and P. J. Schofield. *Comp. Biochem. Physiol.* 38(2B):379-391, 1971.

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6298 GASTROINTESTINAL PROTEIN LOSS IN PATIENTS WITH HOOKWORM INFECTION. (E.) Areekul, S. (Mahidol U. Sch. Trop. Med., Bangkok, Thailand), K. Devakul and Y. Chantachum. *J. Med. Assoc. Thai.* 54(1):28-32, 1971.

6299 STUDY OF VITAMIN B12 AND FOLIC ACID DEFICIENCY IN HOOKWORM DISEASE. (E.) Saraya, A. K. (All-India Inst. Med. Sci., New Delhi), B. N. Tandon and K. Ramachandran. *Am. J. Clin. Nutr.* 24(1):3-6, 1971.

6300 SALMONELLOSIS. (E.) Christie, A. B. (Fazakerley Hosp., Liverpool, England). *Br. J. Hosp. Med.* 5(3):331-342, 1971.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	min	minute(s)
ADP	adenosine diphosphate	ml	milliliter(s)
AMP	adenosine monophosphate	mm	millimeter(s)
ATP	adenosine triphosphate	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotanamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotide phosphate
CNS	central nervous system	NADPH	reduced nicotinamide adenine dinucleotide phosphate
cpm	counts per minute	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	pg	picogram (10^{-12})
e.g.	for example	p.o.	orally
g	gram(s)	ppm	parts per million
µg	microgram(s)	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
i.m.	intramuscular	resp.	respectively
i.p.	intraperitoneal	Rev.	review (only in citations)
IU	international unit(s)	RNA	ribonucleic acid
i.v.	intravenous	s.c.	subcutaneous
kg	kilogram(s)	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase	SGPT	serum glutamic-pyruvic transaminase
m	meter(s)	U	unit(s)
M	molar	UV	ultraviolet
mEq	milliequivalent(s)	WBC	white blood cells (leukocytes), white blood count
mM	millimolar	yr	year(s)
µM	micromolar		
mC,µC	milli-,microcurie(s)		
mg	milligram(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6301 IMMUNOFLUORESCENT LOCALIZATION OF SECRETIN IN THE CANINE DUODENUM. (E.) Polak, J. M. (Roy. Postgrad. Med. Sch., London), S. Bloom, I. Coulling and A. G. E. Pearse. *Gut* 12(8):605-610, 1971.

Endocrine polypeptide (APUD) cells showing specific secretin fluorescence were very numerous in the canine duodenum, particularly in the transitional zone of the duodenal mucosa. They were occasionally present in the jejunum, and very rare in the pyloric mucosa. Secretin cells were pyramidal in shape and their hormone storage product was mainly concentrated on the side of the cell facing the basement membrane. The cells were identified, by the use of parallel cytochemical and ultrastructural preparations, as the small granular S cells. Cytochemical characteristics included: strong positive staining with lead hematoxylin, argyrophilia but not argentaffinity, strong luminosity (dark field) in carbodiimide fixed sections, negative xanthydrol reaction for indoles (tryptophan) and negative o-phthalaldehyde staining.

6302 FURTHER OBSERVATIONS CONCERNING THE EFFECTS OF HYPOPHYSECTOMY ON THE GASTRIC MUCOSA OF THE RAT. (E.) Crean, G. P. (Med. Res. Council. Clin. Endocrinol. Unit 2, Edinburgh, Scotland), R. D. E. Rumsey and S. M. Wheeler. *Gut* 12(9):721-726, 1971.

Hypophysectomized rats showed a significant reduction in stomach weight, surface area, height, thickness and volume of the gastric mucosa. The parietal cell counts per unit area were unaffected by the experiment, whereas the peptic cell population per unit area was greatly reduced by hypophysectomy and indicated a reduction in the number of peptic cells in the gastric glands after hypophysectomy. A reduction in the total parietal cell population following hypophysectomy was attributed to the reduction (50%) in total surface area following the operation, whereas the concomitant reduction in the total peptic cell population following hypophysectomy was caused by the reduction in the average number of peptic cells per unit area (70%) as well as the reduction in total surface area of the stomach (50%). These results could not be accounted for by inhibition of somatic cell growth following hypophysectomy but were due to a direct effect of pituitary deprivation on the stomach. This was indicated by the fact that sham hypophysectomized rats showed the same degree of somatic inhibition through underfeeding as did the experimental hypophysectomized rats. However, the reduction in surface area and total cell population was smaller in magnitude than that following hypophysectomy and did not affect the number of peptic cells in the gastric glands. Thus, the pituitary is seemingly important in influencing growth of the mucosa of the gastric glands.

6303 ULTRASTRUCTURAL CHANGES IN SALIVARY GLAND ACINI AFTER EXPERIMENTAL ADMINISTRATION OF ETHIONINE. (Ger.) Donath, K. (U. Hamburg Pathol. Inst., Germany), P. Feustel and G. Seifert. *Virchows Arch.* [*Pathol anat.*] 343(4): 360-374, 1971.

Administration of ethionine (0.2 mg/g/day i.p. for 10 days; maximum dose 244 mg) to female Wistar rats initially caused the formation of vacuoles in the rough endoplasmic reticulum and was followed in the parotid gland by the appearance of vacuoles in the Golgi apparatus and disorders in zymogen granule synthesis. These changes, which are manifestations of disorders in enzyme synthesis, were much more evident and occurred much earlier in the parotid gland than in the submandibular or sublingual glands and are correlated with the rate of enzyme synthesis. Crystalloid particles, which appeared in the mucoid vacuoles of the submandibular gland after 8 days of ethionine treatment, appear to be the product of disturbances in mucus secretion. Regenerative changes in the endoplasmic reticulum and in zymogen granule synthesis in the parotid are believed to be an adaptation reaction of the cell to metabolic changes.

6304 GASTRIC AND PANCREATIC SYMPATHETIC DENERVATION IN THE RAT. TECHNIQUE AND RESULTS. (E.) Alm, P. (U. Lund Inst. Anat. Histol., Sweden), G. Liedberg, and C. Owman. *Scand. J. Gastroenterol.* 6(4):307-312, 1971.

A technique is described for removal of the celiac and superior mesenteric ganglions which was used in male albino rats. Stomach and pancreas specimens were assayed for biogenic amines by formaldehyde fluorescence, microspectrofluorimetric, and chemical methods. In the stomach of unoperated rats adrenergic nerves were present in the mucosa, submucosa, and muscularis layers, chiefly in proximity to blood vessels. Very small vessels in the basal part of the lamina propria gave off branches that passed straight between the gastric crypts perpendicularly to the mucosal surface, anastomosing with each other by a number of side branches. These were the smallest vessels in the gastric mucosa and were accompanied by only a small number of fine, varicosed, adrenergic nerve terminals. After celiac and superior mesenteric ganglionectomy, alone or in combination with truncal vagotomy, there was no detectable neural fluorescence in the stomach or pancreas, but vagotomy alone caused no appreciable changes in the adrenergic nerves. Ganglionectomy caused a significant decrease in the concentration of pancreatic norepinephrine and complete disappearance of norepinephrine from the duodenum and jejunum. Division of the left gastric artery and its periarterial nerves resulted in complete disappearance of adrenergic nerves in the fundus and, to a lesser extent, in the antrum; similar results were obtained after section of the right gastroepiploic artery and its periarterial nerves. The acid secretory response to supramaximal doses of pentagastrin was the same in ganglionectomized and nonoperated rats.

6305 STUDIES ON GASTROINTESTINAL HORMONES. V. DISTRIBUTION OF GASTRIC SECRETORY INHIBITING SUBSTANCE IN WHALE GASTROINTESTINAL MUCOSA. (E.) Kabeno, H. (Nissui Pharm. Co., Saitama-ken, Japan), T. Honda, Y. Kobayashi and T. Murata. *Chem. Pharm. Bull. (Tokyo)* 19(7): 1487-1490, 1971.

Mucosal specimens were removed from the beginning of the 3rd stomach to a point 40 m distal to the beginning of the small intestine of a sperm whale (Physeter catadon). A benzoic acid-acetone extract was purified by passing it through a Sephadex G-100 column and then through Sephadex G-10 gel. The inhibitory effect of the eluted fraction on gastric acid secretion was measured by injecting 20 mg/kg i.v. into male pylorus-ligated rats. Crude material from the first 15 m of the small intestine had the greatest biological activity (83-88%). After gel filtration the yields of material from the 3rd stomach and the first 5 m of small intestine were about twice those from the 4th stomach and next-to-last 10 m of small intestine, and these yields seemed to parallel the biological activities of the crude extract. The biological activities of the first 2 fractions were 66.0% and 71.4%, resp. after gel filtration. The chemical composition of all fractions was similar: all contained glycoproteins constituted of 70% protein, 5% hexose, and 10% hexosamine.

6306 COMPARATIVE IMMUNOFLUORESCENT AND CYTOCHEMICAL STUDIES OF HUMAN GASTRIN CELLS. (Ger.) Mitschke, H. (U. Hamburg Pathol. Inst., Germany). *Virchows Arch.* [*Pathol. Anat.*] 353(4): 347-359, 1971.

In gastric mucosa from subjects who died suddenly and from stomach ulcer patients, gastrin-containing cells were stained by an immunofluorescent method using rabbit antibodies to synthetic human gastrin. These cells, which were larger than adjacent mucus-secreting cells, were found most often in the middle third of the antral glands and, in most cases, were associated with changes characteristic of chronic atrophic gastritis and intestinal metaplasia. These gastrin cells were not impregnated with silver by Grimelius' method nor stained with the lead hematoxylin, carbodiimide, or diazonium reactions. It is concluded that argyrophilic G-cells and gastrin-containing cells are probably 2 different types of endocrine cells.

6307 OBSERVATIONS OF ISOLATED ENTEROCYTES AND OF THEIR SUBCELLULAR COMPONENTS USING TRANSMISSION AND SCANNING ELECTRON MICROSCOPY. (E.) Marsh, M. N. (Boston U. Med. Ctr., Mass.). T. J. Peter, and A. C. Brown. *Gut* 12(7):499-508, 1971.

The appearance of isolated enterocytes and various enterocyte subcellular fractions in the jejunum of adult rats and guinea pigs were studied with scanning and transmission electron microscopy. Isolated epithelial cells were wider at their apical margins and tapered towards their basal poles. The basal pole of each cell was rounded, and although it was not possible to recognize desmosomal attachments, large intercellular connections were frequently seen. The regular packing of the microvilli was dramatically displayed despite their beaded appearance. The 3-dimensional structure of the brush border was easily studied with scanning electron microscopy: mitochondria and lysosomes appeared as spherical objects of varying diameter, and could not be distinguished from each other at the level of resolution used. No evidence of nuclear pores could be seen, and the limiting membrane appeared as a smooth structure in the scanning electron microscope.

6308 IMMUNOHISTOCHEMICAL LOCALIZATION OF ENTEROKINASE IN THE PORCINE INTESTINE. (E.) Takano, K. (Kitasato U. Sch. Med., Kanigowa-ken, Japan), T. Suzuki and K. Yasuda. *Okajimas Folia Anat. Jap.* 48(1):15-27, 1971.

Cells which demonstrated intense fluorescence in the small intestine were apparently goblet cells. There was no difference in the goblet cell fluorescence intensity between that in the mucous epithelium and that in the intestinal gland. The amount of fluorescent material in each goblet cell varied depending upon the phase of the secretory cycle. In the pre-secretory stage, the fluorescence was found diffusely spread in the cytoplasm. Some goblet cells contained the fluorescent substance in a concentrated form in the apical cytoplasm while others had lesser amounts in the granular pattern. The accumulation of the material in the apical cytoplasm makes some protrusion of the cytoplasm in the intestinal lumen. The intensity of the fluorescence was lower in the goblet cells of the large intestine than in those of the small intestine, though the goblet cell is more abundant in the former than in the latter. Together with alkaline phosphatase, non-specific esterase and with gamma-A, enterkinase apparently lodges in the goblet cell. The enzyme may hydrolyze several peptidase in the large intestine rather than activate trypsinogen in the small intestine.

6309 MORPHOLIGICAL STUDIES OF REJECTION IN CANINE JEJUNAL ALLOGRAPHS. (E.) Holmes, J. T., M. S. Klein, S. J. Winawer (Mem. Hosp., New York, N. Y.) and J. G. Fortner. *Gastroenterology* 61(5):693-706, 1971.

Sequential observation of the rejection process in canine jejunal allografts and normal controls with Thiry-Vella loops is reported. The control group with Thiry-Vella loops looked normal, continued to secrete and exhibited normal peristalsis throughout the 6 months of observation. No difference was noted between those controls that received immunosuppressive therapy and those that did not. Dogs with jejunal allografts and no immunosuppressive therapy showed an average allograft survival time of 8 days as opposed to the allografts in dogs with immunosuppressive treatment that lasted from 5-125 days, with an average graft survival time of 25 days. As soon as one hr after transplantation, allografted animals showed mucosal changes of shortening and blunting of the villi with mucosal flattening. Crypt cell necrosis followed by villus and deep layer destruction with infiltration of the mucosa were present. An increase in the number of mitotic figures was seen in the crypts within 1 hr. of operation. Most of these inital changes reverted to normal within 24 hr. With progressive rejection, the villus-crypt ratio decreased while the mitotic index increased. Dogs receiving immunosuppressive therapy showed similar changes in mitotic index and villus-crypt ratios as those not receiving the therapy, but the course of rejection was more prolonged. All allografts demonstrated a rejection pattern that was easily recognizable and predictable using sequential morphological observations and this technique is potentially useful in monitoring rejection.

6310 THE DISTRIBUTION OF ESTERASE IN THE RAT SMALL INTESTINE. (E.) Kawashima, T. (Okayama U. Med. Sch., Japan). *Acta Med. Okayama* 24(4):389-398, 1970.

Light microscopy showed that indoxylacetate esterase activity was present in the cytoplasm of columnar cells, particularly at the apices of the villi, in frozen sections of rat jejunum. The striated borders and nuclei of absorptive cells and whole goblet cells were all esterase-negative. In unfrozen blocks the striated borders of epithelium at the apices of villi had greater esterase activity than those in the deeper portions of the crypts of Lieberkühn, and the cellular borders of the goblet cells also had pronounced esterase activity. Under the electron microscope unfrozen sections of jejunum showed esterase activity on the membrane of microvilli on absorptive cells and in the bordering membrane of goblet cells. Other elements in jejunal epithelial cells were all esterase-negative. Some artefacts were found in frozen blocks of rat jejunum.

6311 GLUCOSE 6-PHOSPHATASE ACTIVITY IN THE INTESTINAL EPITHELIUM OF THE MOUSE. (E.) Hugon, J. S. (U. Sherbrooke Med. Ctr., Quebec, Canada), D. Maestracci, and D. Ménard. *J. Histochem. Cytochem.* 19(9):515-525, 1971.

Swiss ICR male mice were fasted for 21 hours before sacrifice and removal of samples of the duodenum, jejunum, ileum and colon. The activity of glucose-6-phosphatase was assayed in whole homogenates of these tissue samples. Enzyme activity (expressed as 100 X μM phosphorus liberated/min/mg protein) was: duodenum, 1.14; proximal jejunum, 1.57; middle jejunum, 2/31; distal jejunum, 1.86; ileum, 0.22; and colon, 0.13. By light microscopy it was seen that the maximum activity within each intestinal segment was in the median part of the villi. In most cases enzyme activity was localized in the absorbing cells. In the epithelial cells, enzyme activity was observed by electron microscopy in the smooth- and rough-endoplasmic reticulum and in the nuclear envelope, but not in the cisternae of the Golgi apparatus.

6312 HOW FREQUENTLY IS A PALPABLE LIVER TO BE FOUND DURING SYSTEMATIC EXAMINATION OF AN APPARENTLY HEALTHY POPULATION? (E.) Čerlek, S. (U. Zagreb Dr. O. Novosel Med. Sch., Yugoslavia), J. Sivački, S. Brzović, D. Krasulja and B. Mostovac. *Acta Hepatosplenol. (Stuttg.)* 18(5):397-402, 1971.

The frequency of palpable livers during a systematic examination of an apparently healthy population was determined in 1101 subjects from a rural village (Gradina). In approximately 42% of the 515 examined males and 49% of the 586 examined females, the liver was palpated below the right-rib arc along the midclavicular line. Up to age 20 the liver was soft 3 times more frequently than it was medium hard, while up to age 40, a medium hard liver was found twice as frequently as a soft one, and between the ages of 40 and 60 almost 3 times more frequently. Size and consistency of the liver seem to be inversely related in this population. Approximately 35% of the subjects had gastrointestinal disorders and difficulties with no significant difference in palpability of the liver between those with, and those without gastrointestinal problems.

6313 A CYTOCHEMICAL STUDY OF LIVER PROLIFERATION AND EXPERIMENTAL LIVER DISORDERS IN THE RAT. (E.) Ekelund, P. (U. Helsinki 2nd Dept. Pathol). *Acta Pathol. Microbiol. Scand [A]* 79(5):445-454, 1971.

A cytochemical study was done on rat liver following partial hepatectomy, α-naphthyl isothiocyanate poisoning (45 mg/kg p.o. through a stomach tube for 1-15 days), or thioacetamide intoxication (200 mg/kg i.p.). After hepatectomy, hepatocyte cytoplasm exhibited marked fat vacuolization; the basic canalicular pattern was distributed by extensive branching, as evidenced by staining for naphthylamidase; and activities of β-glucuronidase and succinate dehydrogenase were increased. A biphasic proliferation pattern was observed after thioacetamide injection. An initial stage of bile canalicular branching was followed by hepatocellular damage and then by a second stage of canalicular branching. Bile canalicular dilatation was a main feature during α-naphthyl isothiocyanate administration. β-Glucuronidase but not succinate dehydrogenase was increased following the isothiocynate. These results seem to offer useful cytochemical criteria of hepatocellular proliferation.

6314 CORTICOSTEROID EFFECT ON HEPATIC COLLAGENS. (E.) Hirayama, C. (Kyushu U. Fac. Med., Fukuoka, Japan), I. Morotomi, and K. Hiroshige. *Experientia* 27(8):893-894, 1971.

Administration of cortisone acetate (1 mg/100 g/day i.m. for 5 days) to rats caused a reduction in the contents and specific radioactivities (incorporation of ^{14}C-proline) of hepatic collagens, particularly neutral soluble collagen. In the livers of cortisone-treated rats collagenolytic activity was recovered primarily in the nuclear and lysosomal fractions. Cortisone increases lysomal collagenolytic activity in the liver, but it is not clear whether this activity originates in the hepatocytes or mesenchymal. Induced collagenolytic activity in the nuclear fraction is attributed to activity in mesenchymal cells which contaminate this fraction. The effect of cortisone on liver collagens could be explained either by inhibition of anabolism in fibroblasts or by induction of catabolism. Insoluble collagen appears to be metabolically inert.

6315 ANATOMY OF STOMACH OF RAT. (E.) Way, L. W. (U. California Dept. Surg., San Francisco). *Gastroenterology* 61(3):413-414, 1971.

6316 RAT INTRINSIC FACTOR. PARTIAL PURIFICATION AND CHARACTERIZATION. (E.) Ashworth, L. A. E. (Stanford U. Sch. Med., Calif.) and K. B. Taylor. *Biochim. Biophys. Acta* 230(3): 468-478, 1971.

6317 CYTOLOGIC FEATURES OF THE EXOCRINE PANCREATIC CELL IN THE NEWBORN MOUSE. (Fr.) Nugeyre, P. (Sch. Med. Pharm., Clermont/Ferrand, France). *C. R. Soc. Biol. (Paris)* 164(8-9):1693-1694, 1970.

6318 THE CONNECTIVE TISSUE SKELETON OF THE LIVER. (Sp.) Alvarez Morujo, A. (U. Salamanca Sch. Med., Spain). *An. Anat. (Granada)* 20(49):5-18, 1971.

6319 PORTOSYSTEMIC COMMUNICATIONS IN THE CAT. (E.) Khan, I. R. (Washington State U. Dept. Vet. Anat., Pullman, Wash.) and A. Vitums. *Res. Vet. Sci.* 12(3):215-218, 1971.

6320 A SIMPLE METHOD FOR THE ISOLATION OF RAT LIVER CELL PLASMA MEMBRANES IN ISOTONIC SUCROSE. (E.) Nigam, V. N. (Notre-Dame Hosp. Inst. Cancer, Montreal, Quebec, Canada), R. Morais and S. Karasaki. *Biochim. Biophys Acta* 249(1):34-40, 1971.

6321 SIZE DISTRIBUTION OF MEMBRANE PROTEINS OF RAT LIVER AND THEIR RELATIVE RATES OF DEGRADATION. (E.) Dehlinger, P. J. (Stanford U. Sch. Med., Calif.) and R. T. Schimke. *J. Biol. Chem.* 246(8):2574-2583, 1971.

6322 A CIRCULAR DICHROISM STUDY ON THE CONFORMATION OF DNA IN RAT LIVER CHROMATIN. (E.) Matsuyama, A. (Natl. Cancer Ctr. Res. Inst., Tokyo), Y. Tagashira and C. Nagata. *Biochim. Biophys. Acta* 240(2):184-190, 1971.

6323 ULTRASTRUCTURAL CHANGES IN THE CYTOPLASM OF HEPATIC CELLS. (E.) Rouiller, C. (Inst. Histol., Geneva, Switzerland). *Triangle* 9(6):209-219, 1971.

6324 ULTRASTRUCTURAL AND MORPHOMETRIC INVESTIGATION OF LIVER PARENCHYMAL CELLS IN THE RAT AFTER ADMINISTRATION OF CHOLERETIC AGENTS. (Ger.) Bianchi, L. (U. Basel Pathol. Inst., Switzerland), R. Ott and H. P. Rohr. *Acta Hepatosplenol. (Stuttg.)* 18(4): 305-312, 1971.

6325 THE DISTRIBUTION OF THALLIUM IN KIDNEY AND LIVER IN LETHAL THALLIUM POISONING. (Ger.) Weinig, E. (U. Erlangen Nuremberg Inst. Leg. Med., Germany) and W. Walz. *Arch. Toxicol.* 27(3-4):217-225, 1971.

6326 FLUOROMETRIC DETERMINATION OF VITAMIN A IN HUMAN BLOOD AND LIVER. (E.) Thompson, J. N. (Dept. Natl. Health Welfare, Ottawa, Ontario, Canada), P. Erdody, R. Brien and T. K. Murray. *Biochem. Med.* 5(1):67-89, 1971.

6327 GAS-LIQUID CHROMATOGRAPHIC ANALYSIS OF CARDIOLIPIN FROM FETAL AND MATERNAL LIVER OF THE RAT. (E.) Winkler, L. (Friedrich Schiller U. Inst. Pathol. Physiol., Jena, Germany), N. F. Buanga and E. Goetze. *Biochim. Biophys. Acta* 231(3):535-536, 1971.

6328 THE LOCALIZATION OF SERUM ALBUMIN IN HUMAN LIVER CELLS. (E.) Brozman, M. (Komensky U. Sch. Med., Bratislava, Czechoslovakia). *Acta Histochem. (Jena)* 39(1):89-100, 1971.

6329 LIVER IRON STORES IN DIFFERENT POPULATION GROUPS IN SOUTH AFRICA. (E.) Charlton, R. W. (U. Witwatersrand Dept. Pharmacol., South Africa), T. H. Bothwell and F. G. H. Mayet. *S. Afr. Med. J.* 45(19):524-529, 1971.

6330 EXPERIMENTAL STUDIES ON THE NUTRITION AND OXYGEN SUPPLY OF HEPATOCYTES ACCORDING TO THEIR LOCATION IN THE LIVER LOBULE. (Ger.) Warchol, J. B. (Med. Acad. Inst. Histol. Embryol., Poznan, Poland). *Acta Histochem. (Jena)* 39(1):81-88, 1971.

6331 ON THE STRUCTURE-LINKED SEDIMENTABILITY OF RAT LIVER β-N-ACETYLGLUCOSAMINIDASE. (E.) Baccino, F. M. (Univ. Turin Inst. Gen. Pathol., Italy) and M. F. Zuretti. *Biochim. Biophys. Acta* 235(2):353-357, 1971.

6332 THE PURIFICATION AND PROPERTIES OF THE L-SERINE-O-SULPHATE DEGRADING SYSTEM OF PIG LIVER. (E.) Tudball, N. (Univ. Coll. South Wales, Dept. Biochem., Cardiff), P. Thomas and R. Bailey Wood. *Biochem. J.* 121(5):747-752, 1971.

6333 HISTONE PHOSPHOKINASE ACTIVITY IN NUCLEAR AND CYTOPLASMIC CELL FRACTIONS FROM NORMAL AND REGENERATING RAT LIVERS. (E.) Siebert, G. (U. Oxford Dept. Biochem., England), M. G. Ord and L. A. Stocken. *Biochem. J.* 122(5):721-725, 1971.

6334 STIMULATION OF PHOSPHOLIPID EXCHANGE BETWEEN MITOCHONDRIA AND ARTIFICIALLY PREPARED PHOSPHOLIPID AGGREGATES BY A SOLUBLE FRACTION FROM LIVER. (E.) Zilversmit, D. B. (Cornell U. Grad. Sch. Nutr. Ithaca, N. Y.). *J. Biol. Chem.* 246(8):2645-2649, 1971.

6335 ALBUMIN IN EPITHELIAL CELLS OF INTRAHEPATIC BILE DUCTS IN MAN. (E.) Brozman, M. (Komensky U. Pathol. Inst., Bratislava, Czechoslovakia). *Acta Histochem. (Jena)* 39(1):173-175, 1971.

6336 HEPATIC LESION FOLLOWING PARTIAL EXPERIMENTAL LIGATION OF THE SUPRAHEPATIC VENA CAVA. HISTOLOGICAL AND ULTRASTRUCTURAL INVESTIGATIONS. (Fr.) Mallet Guy, Y. (Edouard Herriot Hosp., Lyon, France), Y. Mandairon and T. Debiec. *Ann. Gastroenterol. Hepatol. (Paris)* 7(2):99-118, 1971.

6337 EFFECT OF NEUTRON GAMMA-RADIATION ON THE MORPHOLOGY OF THE MUCOSA OF THE SMALL INTESTINE OF GERMFREE AND CONVENTIONAL MICE. (E.) Jervis, H. R. (Walter Reed Army Med. Ctr., Washington, D. C.), M. M. McLaughlin and M. C. Johnson. *Radiat. Res.* 45(3):613-628, 1971.

6338 A METHOD FOR PREPARING STABLE DENSITY GRADIENTS AND THEIR APPLICATION FOR FRACTIONATION OF INTESTINAL MUCOSAL CELLS. (E.) Huebers, H. (U. Saarland Inst. Biochem., Homburg/Saar, Germany), E. Huebers, J. Simon and W. Forth. *Life Sci.* [*II*] 10(7):377-384, 1971.

6339 ASYMMETRIC DISTRIBUTION OF OUABAIN-SENSITIVE ATPase ACTIVITY IN RAT INTESTINAL MUCOSA. (E.) Fujita, M. (Tokyo Med. U. Sch. Med.), H. Matsui, K. Nagano and M. Nakao. *Biochim. Biophys. Acta* 233(2):404-408, 1971.

6340 A NEW SMALL INTESTINE HORMONE. (Ger.) Ottenjann, R. (German Diagn. Clin., Wiesbaden, Germany). *Dtsch. Med. Wochenschr.* 96(19):838-839, 1971.

See also numbers: 6345, 6415, 6421, 6422, 6434, 6435, 6438, 6442, 6445, 6512, 6618, 6739, 6817

6341 STUDIES ON GASTRIC ABSORPTION OF LIPIDS IN THE SUCKLING RAT. (E.) Egelrud, T. (U. Umea Dept. Physiol. Chem., Sweden), T. Olivecrona, and H. Helander. *Scand. J. Gastroenterol.* 6(4):329-333, 1971.

Ten-day-old Sprague-Dawley rats underwent pyloric ligation with insertion of a plastic cannula into the stomach through which labeled fats, fatty acids, cholesterol, and cholesterol palmitate were instilled into the stomach for up to 1 hr. After these intervals the stomach and its contents were assayed for label and expired air for labeled CO_2 as an indication of net absorption of the compounds. When the stomach was treated as a closed system, large amounts of octanoic and decanoic acid were absorbed, but no net absorption of lauric acid, oleic acid, trioleate, cholesterol, or cholesterol palmitate occurred. Gastric absorption of octanoic acid was greater during the initial 15-min period than during successive intervals. Thus, suckling rats readily absorb medium-chain fatty acids but not long-chain fatty acids, triglycerides, partial glycerides, cholesterol, or cholesterol esters. Medium-chain fatty acids are probably absorbed by diffusion through the gastric mucosa.

6342 ELECTRICAL PROPERTIES OF ISOLATED CELLS OF NECTURUS GASTRIC MUCOSA. (E.) Blum, A. L., B. I. Hirschowitz, H. F. Helander, and G. Sachs (VA Hosp., Birmingham, Ala.). *Biochim. Biophys. Acta* 241(2):261-272, 1971.

Studies were made with micropuncture in isolated surface epithelial cell and oxyntic cells and in intact isolated tubules from the gastric mucosa of *Necturus*. The electric potentials were similar to those of identical cells in intact gastric mucosa, but the membrane resistance in isolated cells was 100 times greater than that in intact preparations. When the concentration of K^+ was increased from 4 to 18.5 mM and the Na^+ concentration was correspondingly decreased, the potential difference of isolated oxyntic cells decreased by 17 millivolts. As a result of 3-dimensional glandular infolding, the measured resistance was found to be only 1/2 of the calculated value.

6343 GLUCOSE BINDING BY INTESTINAL BRUSH BORDERS OF RATS. (E.) Olsen, W. A. (Madison VA Hosp., Wis.) and L. Rogers. *Comp. Biochem. Physiol.* 39(3B):617-625, 1971.

Intestinal brush border preparations from male Holtzman rats (*Rattus norvegicus*) bound D-glucose in preference to L-glucose and mannitol. The binding of D-glucose to brush borders was twice that to mucosal homogenates. The amount of binding varied directly with the number of brush borders. D-glucose did not bind to rat liver homogenates but did bind to brush borders from germ-free rats, ruling out the possibility of nonspecific binding to protein and uptake by bacterial contaminants. The binding of D-glucose by the brush borders was found to be a saturable process and a Lineweaver-Burke plot was linear with 2 μM. Galactose competitively inhibited the binding of D-glucose to brush borders. Binding was also inhibited by cold, presence of phlorizin, and omission of sodium from the medium, but not by anoxia. These findings suggest that the specific uptake of D-glucose by rat brush borders is related to intestinal glucose absorption.

6344 TRANSPORT CHARACTERISTICS OF THE AMINO ACID ANALOGUES, CYCLOSERINE AND α-METHYLDOPA, USING RAT SMALL INTESTINE *IN VITRO*. (E.) Wass, M. (Chelsea Coll. Sci. Technol., London) and D. F. Evered. *Life Sci.* [*II*] 10(17):1005-1013, 1971.

In everted sacs and everted segments of rat small intestine neither D- nor L-cycloserine was transported against a concentration gradient; transport of D-cycloserine was linear with concentration down a concentration gradient. D-cycloserine was apparently absorbed across the intestinal mucosa by simple passive diffusion. The failure of alanine, a structural analogue, to inhibit uptake of D-cycloserine is also consistent with simple diffusion across the intestinal mucosa. Neither L-α-methyldopa nor L-dopa was transported against a concentration gradient. In both cases a considerable fall in the concentration in the serosal fluid may indicate metabolic loss. Transport of L- and D-α-methyldopa down a concentration gradient was slow. Although transport of the L-isomer occurred somewhat more rapidly than the D-isomer, the difference was not statistically significant. Previous findings have suggested that L-α-methyldopa participates in the transport system for monoaminocarboxylic acids. However, inhibition of transport was also demonstrated with acidic and basic amino acids, suggesting a more general type of inhibition.

6345 SYNTHESIS AND TRANSPORT OF LIPOPROTEIN PARTICLES BY INTESTINAL ABSORPTIVE CELLS IN MAN. (E.) Tytgat, G. N. (U. Leuven Dept. Med., Belgium), C. E. Rubin, and D. R. Saunders. *J. Clin. Invest.* 50(10):2065-2078, 1971.

Fasting human jejunal biopsies were studied by electron microscopy after special staining to determine where the human intestine synthesizes lipoprotein particles and how these particles gain access to the circulation. Lipoprotein particles (150-650 A in diameter) were seen within the smooth endoplasmic reticulum and Golgi cisternae of absorptive cells covering the tips of jejunal villi, but not within the lumen, microvilli, or terminal web area. By a process of reverse micropinocytosis these particles seemed to exist from the cell, enter the extracellular matrix of the lamina propria and then enter the lacteal lumina. Ultracentrifugation studies revealed that these particles were similar in size distribution to very-low-density lipoprotein particles found in plasma. During absorption of a fatty meal, the size distribution of lipid particles extracted from jejunal biopsies changed from that of the smaller lipoprotein particles toward that of the larger chylomicrons. During fat absorption the percentage of triglyceride in the lipid particles was increased. Thus, chylomicrons may be derived from intestinal lipoprotein particles *via* expansion of the triglyceride compartment.

6346 UNIDIRECTIONAL Na FLOW IN RAT JEJUNUM BEFORE AND DURING INTRAVENOUS INFUSION OF 0.9% NaCl. (E.) Hornych, A. (Tenon Hosp., Paris), N. Loreau, and G. Richet. *Rev. Eur. Etud. Clin. Biol.* 16(7):673-678, 1971.

Sodium transport in the jejunum of Sprague-Dawley rats was studied by using an *in vivo* perfusion method. In animals on a normal salt diet, from the start of i.v. infusion of 0.9% NaCl, transfer was modified and net absorption fell and was replaced by an exsorption which increased during the last period. Plasma sodium remained essentially unchanged. In 4 rats on a normal salt diet who were involved in a prolonged experiment the changes in net transfers, which followed the same pattern as in the above group, were due to a marked increase in the outflow which rose from 35.3±5.3 µEq/hr/cm immediately before NaCl infusion to 49.8±5.5 µEq/hr/cm in the third experimental period. In a group of 8 sodium-depleted rats, the results concerning net transfers and inflow were similar to those observed in the prolonged experiment in rats on a normal diet. The variations in net transfer are due to back-diffusion of Na^+. The latter is not linked to changes in the concentration gradient which remains constant.

6347 ACTIVE F^- TRANSPORT: SPECIES AND AGE EFFECTS WITH RODENT INTESTINE, *IN VITRO*. (E.) Parkins, F. M. (U. Iowa Coll. Dent., Iowa City). *Biochim. Biophys. Acta* 241(2):507-512, 1971.

Fluoride transport was measured across everted sacs of terminal ileum from 8-10-week-old male rats, gerbils, guinea pigs, and hamsters. There was net accumulation of fluoride in the mucosal fluid and a net loss of fluoride from the serosal fluid in sacs from rats, hamsters, and gerbils. The highest rates of active transfer occurred in sacs from gerbils and hamsters. In guinea pig intestine the loss of fluoride from the mucosal fluid was about 1/3 of the fluoride lost from the serosal fluid. When $SO_4^=$ was substituted for Cl^- on the serosal side of sacs from gerbil ileum, no change occurred in the net movement in either the serosal or mucosal compartments, whereas when $SO_4^=$ was substituted for Cl^- in the mucosal compartment, there was a net loss of fluoride in the mucosal fluid and no significant change in total fluoride within the serosal compartment. In ileal sacs from 4-18-week-old rats and gerbils active fluoride transport decreased with increasing age. Fluoride secretion by active transport also occurred in sacs of jejunum and large intestine from gerbils, confirming that the process takes place alone the entire length of the rodent intestine.

6348 THE EFFECTS OF ANTACIDS ON THE ABSORPTION OF ORALLY ADMINISTERED PENTOBARBITAL IN THE RAT. (E.) Hurwitz, A. (U. Kansas Med. Ctr., Kansas City) and M. B. Sheehan. *J. Pharmacol. Exp. Ther.* 179(1):124-131, 1971.

While control animals lost the righting reflex 6 min after p.o. administration of pentobarbital (60-80 mg/kg through a stomach tube) animals which were pretreated with either milk of magnesia or aluminum hydroxide had not done so by 17-20 min. Both antacids caused an increased retention of the hypnotic in the stomachs, lower serum pentobarbital levels and a delay in the onset of pentabarbital-induced sleep. The gastric pH, which was increased to 7.5 by sodium pentobarbital, was further raised by magnesium hydroxide which shifted the pentobarbital to the ionized unabsorbable form, whereas aluminum hydroxide lowered the pH. Aluminum hydroxide acts by retarding gastric emptying, markedly increasing the fluid volume and pentobarbital retention in the stomach. This property is shared by other aluminum salts, especially the more soluble and dissociable salts (sulfate, nitrate) rather than the insoluble acetates. Aluminum chloride causes greater pentobarbital retention than atropine sulfate. Trivalent cations (aluminum and lanthanum), but not divalent cations (magnesium and calcium), delayed the onset of sleep for at least 20 min. An antacid containing both magnesium and aluminum hydroxides retards sodium pentobarbital absorption, lowering blood and brain levels of the hypnotic, and delaying its pharmacologic effect.

6349 STUDIES ON THE ABSORPTION AND METABOLISM OF FOLIC ACID. I. FOLATE ABSORPTION IN THE DOG AFTER EXPOSURE OF ISOLATED INTESTINAL SEGMENTS TO SYNTHETIC PTEROYLPOLYGLUTAMATES OF VARIOUS CHAIN LENGTHS. (E.) Baugh, C. M. (U. Alabama Sch. Med., Birmingham), C. L. Krumdieck, H. J. Baker and C. E. Butterworth, Jr. *J. Clin. Invest.* 50(10):2009-2011, 1971.

The effect of synthetic pteroylpolyglutamates of various chain lengths on folate absorption by isolated intestinal segments was studied in dogs using *Lactobacillus casei* and *Streptococcus* *faecalis* assays, column chromatography, and quantitative measurement of pteridine-bound radioactivity. Following the placement of 3 μM of pteroylmono-, di-, tri-, penta-, or hepataglutamate into the lumen of the isolated jejunal segment, biologically active folic acid was detected in the mesenteric vein. Folate absorption appeared to be inversely related to pteroylglutamate chain length; thus the monoglutamate was absorbed most readily. While in each case pteroylmonoglutamate appeared to be the predominant form entering the blood, pteroyldiglutamate was able to enter the mesenteric vein soon after the introduction of pteroyldi- or triglutamate into the jejunal lumen. During the first 30 minutes of passage through the intestinal mucosa there was little or no conversion of the glutamates to reduced or methylated forms. Thus, in the dog, both pteroylmonoglutamates and pteroyldiglutamates can cross the jejunal mucosa without reduction or methylation.

6350 INTRINSIC FACTOR-INDEPENDENT TRANSPORT OF VITAMIN B_{12} ACROSS THE GUT OF THE NEONATAL RAT. (E.) Gallagher, N. D. (Repatriation Gen. Hosp., Concord, Australia) and K. Foley. *Gastroenterology* 61(3):332-338, 1971.

The intestinal absorption and transport of vitamin B_{12} was studied in neonatal rats. Following p.o. administration of ^{57}Co-vitamin B_{12}, approximately 90% of the dose left the intestinal lumen within 5 hrs, the rate of transport reaching a maximum when the dose was 50 ng. The vitamin was most readily absorbed in the lower jejunum and upper ileum. Neither gastric intrinsic factor nor the vitamin B_{12}-binding protein in the mother's milk was necessary for the transport of vitamin B_{12}. The oral administration of vitamin B_{12} analogues interfered with vitamin transport in the intestine. The accumulation of the vitamin in the carcass did not increase beyond 24 hr when as much as 20% of the absorbed dose remained in the wall of the small intestine. A saturable intermediate seems to be involved in the intestinal transport of this vitamin B_{12}. The decrease in intestinal radioactivity after 24 hr seems to be due to the excretion of the vitamin into the intestinal lumen.

6351 EFFECT OF PHOSPHATES UPON IRON ABSORPTION STUDIED IN NORMAL HUMAN SUBJECTS AND IN AN EXPERIMENTAL MODEL USING DIALYSIS. (E.) Peters, T., Jr. (Mary Imogene Bassett Hosp., Cooperstown, N. Y.), L. Apt and J. F. Ross. *Gastroenterology* 61(3):315-322, 1971.

The effect of phosphate salts and phosphate-containing foods on iron absorption was studied in healthy volunteers and under *in vitro* conditions approximating those encountered in the upper gastrointestinal tract after a meal. Neutral phosphate salts or vitelline almost completely blocked iron absorption after p.o. administration, vitelline being more effective than a mixture of phosphates and egg white. When neutral sodium phosphate was added to a ferrous sulfate solution containing 10 μg iron/ml at a pH near 7, the initial rate of iron oxidation increased 20-fold. Even in the presence of ascorbic acid, phosphate was effective in depressing ferrous iron levels. Using a dialysis model to simulate absorption, it was demonstrated that in the presence of 0.1% ascorbic acid the added iron was completely dialyzable at pH 1.3, similar to the pH in the empty stomach. At pH 4.2, iron still dialyzed readily except when either egg yolk or vitelline was added, and at pH 7.4, 43% of the iron diffused through the membranes in the absence of foods; starch, egg white, and butter had little effect on iron diffusion. The addition of ascorbic acid depressed the dialysis of iron to varying degrees, indicating that such a reducing or complexing agent is necessary to make iron soluble in the presence of phosphoproteins. The gastric and intestinal contents with which iron comes in contact seem to be of more importance than the form in which it is ingested.

6352 LOSS OF MACROMOLECULAR BARRIER FUNCTION ASSOCIATED WITH SURGICAL TRAUMA TO THE INTESTINE. (E.) Rhodes, R. S. (Univ. Hosps., Cleveland, Ohio) and M. J. Karnovsky. *Lab. Invest.* 25(3):220-229, 1971.

The effect of surgical trauma, consisting of intestinal wall biopsy and suture closure, on the permeability of the guinea pig small intestine to macromolecules was studied *in vivo* using horseradish peroxidase (HRP) as a histochemical tracer. Two hours after the surgical trauma, 21 of 29 animals had lost macromolecular barrier function as evidenced by the presence of HRP within the mucosal interepithelial spaces, intraepithelial vesicles, and lacteals as well as throughout the lamina propria. Loss of barrier function occurred for at least 10 cm. in either direction from the site of the initial trauma. The group that lost barrier function had significantly greater serum levels of HRP than the group that maintained barrier function. Loss of function of the macromolecular barrier was not due to the length of anesthesia, the trauma of HRP injections, or the diffusion of HRP into the initial biopsy wound. A macromolecular cofactor was required for surgical trauma to induce the loss of barrier function. HRP penetrated the tight junctions of epithelial cells, causing morphological changes and separation of membrane leaflets. The most likely mechanism for the loss of the intestinal barrier to macromolecules seems to be an opening of the zonulae occludentes.

6353 SOME PROPERTIES OF A PREPARATION OF RAT COLON PERFUSED *IN VITRO* THROUGH THE VASCULAR BED. (E.) Parsons, D. S. (U. Oxford Dept. Biochem., England) and G. Powis. *J. Physiol. (Lond.)* 217(3):641-663, 1971.

A new procedure is described for the perfusion of the entire vascular bed of the rat colon by a method which involves no interruption in the supply of oxygen during infusion through both the inferior and the superior mesenteric arteries. The perfusate contained 3 g albumin/100 ml to prevent the formation of excessive serosal exudate and erythrocytes to maintain adequate oxygenation of the preparation. Over a 4-hr period the mean rate of oxygen utilization was 9.2±0.3 μM/hr/g fat-free dry weight. Only when an antihistamine, promethazine hydrochloride (2 mg/100 kg i.v.), was administered to the colon donor rat before operation did ion transport rates approach those found *in vivo*; ultrafiltration of the plasma fluid into the lumen occurred in the absence of antihistamine. The recycled perfusate showed an accumulation of vasodilatory substances. The transport capacity of the preparation was found to decrease with increasing perfusion pressures. An increase in the net lumen to blood flux of CO_2 with concomitant flux of Na^+ and K^+ in a 12:1 ratio was observed when CO_2 was not added to the perfusate. When ammonium was added to the lumen, the secretion of CO_2 into the luminal contents was markedly inhibited.

6354 POLYETHYLENE GLYCOL 4000 AS A CONTINUOUSLY ADMINISTERED NON-ABSORBABLE FAECAL MARKER FOR METABOLIC BALANCE STUDIES IN HUMAN SUBJECTS. (E.) Wilkinson, R. (Gen Infirm., Leeds, England). *Gut* 12(8):654-660, 1971.

The intestinal handling and transit of polyethylene glycol 4000 (PEG), used as a non-absorbable, continuously fed fecal marker, was compared with that of chromium sesquioxide and barium sulfate. All 3 markers were well tolerated by the patients. No toxic effects were observed. The mean recovery of PEG added directly to feces (99.6%) was comparable to that of Cr_2O_3 and Ba SO_4. Apparently the glycol was not absorbed from the human gastrointestinal tract. PEG had a more rapid intestinal transit time than barium sulfate which in turn had a faster transit time than chromium sesquioxide. In contrast to uncorrected values, the polyethylene glycol corrected daily fecal calcium and phosphorus values were virtually constant. Also there was much less variation in the glycol corrected than in the uncorrected fecal fatty acid values. As PEG is water soluble and $BaSO_4$ and Cr_2O_3 are insoluble, the glycol was recommended as a non-absorbable continuously fed fecal marker particularly for dietary constituents which are water soluble.

6355 COMMENTS UPON THE VALIDITY OF TECHNIQUES USED FOR THE MEASUREMENT OF INTESTINAL ABSORPTION. (Fr.) Raynaud, C. (Frederic Joliot Hosp., Orsay, France) and N. Griffiths. *Cah. Med. Lyon* 47(21):2255-2263, 1971.

6356 CHANGES IN WATER AND ELECTROLYTES IN THE GASTROINTESTINAL TRACT. (Sp.) Duffau, T. G. (Roberto Del Rio Hosp., Santiago, Chile). *Pediatria (Santiago)* 13(3):167-172, 1970.

6357 THE INTESTINAL BRUSH BORDER. (E.) Holmes, R. (Roy. Infirm., Manchester, England). *Gut* 12(8):668-677, 1971.

6358 INTESTINAL ABSORPTION OF IRON IN PATIENTS WITH CHRONIC RENAL DISEASES. (Ger.) Sulin, A. W. (Univ. Med. Polyclin., Bern, Switzerland) and A. Blumberg. *Schweiz. Med. Wochenschr.* 101(24):883-887, 1971.

6359 PATHOPHYSIOLOGICAL STUDIES ON IRON METABOLISM. EXPERIMENTAL STUDIES ON INTESTINAL IRON ABSORPTION BY A NEW PERFUSION APPARATUS, WITH SPECIAL REFERENCE TO TRANSPORT OF IRON FROM INTESTINAL MUCOSA TO SUBMUCOSAL TISSUE. (Jap.) Wakasugi (Kyushu U. Sch. Med., Fukuoka, Japan). *Kgushu Ketsueki Kenkyu Dokokaishi (J. Kyushu Haematol. Soc.)* 20(3-4): 205-231, 1970.

6360 EFFECT OF ULTRASOUND ON INTESTINAL ABSORPTION OF PHOSPHATES. (Rus.) Faitelberg Blank, V. R. (Farming Inst., Odessa, USSR) and P. I. Kutsenko. *Fiziol. Zh. SSSR* 57(5):737-743, 1971.

6361 ATTACHMENT OF THE B_{12} BINDING PRINCIPLES OBTAINED FROM *Lactobacillus leichmannii* TO INTESTINAL MUCOSA HOMOGENATES. (E.) Sasaki, T. (Sankyo Co. Ltd., Tokyo). *J. Vitaminol.* 17(1):10-18, 1971.

6362 INHIBITION OF AMINO ACID UPTAKE BY ATP IN ISOLATED INTESTINAL EPITHELIAL CELLS. (E.) Reiser, S. (Indiana U. Sch. Med., Indianapolis) and P. A. Christiansen. *Biochim. Biophys. Acta* 233(2):480-484, 1971.

6363 PARALLEL TEMPERATURE-INDUCED CHANGES IN MEMBRANE FATTY ACIDS AND IN THE TRANSPORT OF AMINO ACIDS BY THE INTESTINE OF GOLDFISH (*Carassius auratus* L.). (E.) Smith, M. W. (ARC Inst. Anim. Physiol., Cambridge, England) and P. Kemp. *Comp. Biochem. Physiol.* 39(28):357-365, 1971.

6364 EFFECT OF LACTATE AND NAD ON GLUCOSE TRANSPORT BY THE EVERTED RAT INTESTINE. (Fr.) Faudemay, F. (Bichat Hosp., Paris), R. Rozen and C. Sautier. *Ann. Biol. Anim. Biochim. Biophys.* 10(4):581-587, 1970.

6365 SALT AND WATER PERMEABILITY OF THE EPITHELIUM OF THE COPRODEUM AND LARGE INTESTINE IN THE NORMAL AND DEHYDRATED FOWL (Gallus domesticus). IN VIVO PERFUSION STUDIES. (E.) Bindslev, N. (U. Copenhagen Inst. Med. Physiol. A) and E. Skadhauge. *J. Physiol. (Lond.)* 216(3):735-751, 1971.

6366 ELECTROPHYSIOLOGICAL STUDY OF GASTRIC MOTOR ACTIVITY. I. COMPARISON OF GASTRIC ELECTROMYOGRAMS IN DIFFERENT SPECIES. (Fr.) Roche, M. (Natl. Inst. Appl. Sci., Villeurbanne, France) and R. Santini. *C. R. Soc. Biol. (Paris)* 164(7):1528-1534, 1970.

Electromyograms were obtained from the stomach in cats, dogs, rats, and rabbits. In all of these animals there is little organized electrical activity in the glandular stomach and a large part of the fundus while electrical activity in the cardia is intense, particularly in rats and rabbits. In rats the largest contractions originating in the cardia are propagated beyond the pylorus; their function may be to ensure transit and stomach emptying. Regular spindle-shaped microvolt waves found in rats are similar in rhythm to slow waves found in cats and dogs. The characteristics and functional significance of gastric electromyograms are apparently associated with diet.

6367 INTRAMEDULLARY PATHWAYS OF THE VAGO-VAGAL REFLEXES WITH SPECIAL REFERENCE TO THOSE EVOKED BY STIMULATION OF THE ABDOMINAL VAGUS. (E.) Nakazato, Y. (Hokkaido U. Sch. Vet. Med., Sapporo, Japan) and A. Ohga. *Jap. J. Physiol.* 21(2):175-188, 1971.

Electrical stimulation of the central end of the cervical vagus nerve in cats under chloralose anesthesia evoked 3 mass reflex discharges in the contralateral cervical vagus nerve (mean latencies: 7, 71 and 107 msec). Stimulation of the thoracic vagus nerve produced 3 mass discharges (mean latencies: 11, 138 and 192 msec); whereas abdominal vagal nerve stimulation caused only one mass discharge (mean latency: 251 msec). The amplitude and threshhold of the mass reflex discharge evoked by afferent stimulation of the abdominal vagus nerve were close to those of the 2nd and 3rd ones evoked by cervical and thoracic vagal stimulation. These discharges may all be the same in origin. The maximum conduction velocity of the afferent fibers which caused the 3rd response ranged between 1.0-1.4 m/sec. When transection of the lower brain stem was carried out at the level 4 mm, but not 5-6 mm, rostral to the obex, mass discharges disappeared. The third mass discharge and sometimes the second one were abolished by a superficial dorsal sagittal section (1-2 mm deep) of the obex with its immediate caudal region. The 3rd mass discharge may in part participate in the vago-vagal reflex control of gastric motility.

6368 ELECTRICAL CONDUCTIVITY AND CHOLINERGIC ACTIVITY OF THE RAT GASTRIC MUCOSA, AT 4 AND 170 HOURS AFTER 600 R X-IRRADIATION. (E.) Vaughan, B. E. (Battelle Mem. Inst., Richland, Wash.) and R. L. Pessotti. *Radiat. Res.* 48(1): 116-127, 1971.

In isolated rat gastric mucosa, 10^{-3}M acetylcholine inhibited the potential specifically without increasing tissue conductance. At 170 hr after whole-body irradiation with 600 r x-rays the gastric mucosa was more sensitive to exogenous acetylcholine, than in controls. After 90 minutes incubation, prior to adding acetylcholine, the resting potentials of irradiated and control groups were indistinguishable. At 4 hr after irradiation, the irradiated mucosas did not show increased sensitivity to acetylcholine as at 170 hr. Irradiation apparently had negligible effect on acetylcholine receptor sites, but potentials were increased, both in the absence and presence of acetylcholine. These elevated potentials showed that intrinsic cholinergic activity was suppressed as a consequence of irradiation. Acetylcholine had negligible effect on conductance values. In the 4-hr irradiation group, conductance was decreased at 2 of the 3 measurement times (100 and 110 min). In the 170-hr group, conductance increased significantly and the mean difference was at least 3-fold larger than variability at all time points. Two factors which could potentially be affected by the excision and incubation procedures were: tissue metabolism and membrane leakiness, but conductance values are indicative of adequate tissue metabolism and membrane integrity.

6369 AN EVALUATION OF ^{113m}INDIUM DTPA CHELATE IN THE MEASUREMENT OF GASTRIC EMPTYING BY SCINTISCANNING. (E.) Heading, R. C. (Roy. Infirm., Edinburgh, Scotland), P. Tothill, A. J. Laidlaw, and D. J. C. Shearman. *Gut* 12(8):611-615, 1971.

The chelate of ^{113m}Indium with diethylenetriamine pentaacetic acid (DTPA) was used with a sequential scintiscanning technique to measure gastric emptying in 30 patients because of its greater gamma-ray emission and short half-life. In contrast to ^{51}Cr, ^{113m}indium DTPA gave values for the gastric emptying time which agreed well when measured on 2 successive days. The indium compound had no pharmacological effect on gastric emptying. Gastric emptying times obtained with ^{51}Cr and ^{113m}indium DTPA were identical in 1 patient, but a smaller potential error was obtained with indium due to greater precision resulting from its higher rate of gamma-ray emission. In vitro studies demonstrated that ^{51}Cr was absorbed to the solid component of the test meal whereas the indium chelate was not. Thus, results obtained with the indium chelate reflect the emptying of the liquid phase of the gastric contents.

6370 MAXIMAL RESPONSES IN GUINEA-PIG ISOLATED ILEUM PREPARATIONS: INFLUENCE OF LONGITUDINAL AND CIRCULAR MUSCLE. (E.) Pomeroy, A. R. (U. Melbourne Dept. Pharmacol., Victoria, Australia) and C. Raper. *J. Pharm. Pharmacol.* 23(10):796-798, 1971.

At higher concentrations used in concentration-effect curves, choline and tetramethylammonium (TMA) produced a spasm in Magnus preparations of guinea-pig ileum which was seen on the trace as irregular oscillations. TMA was more active than choline in inducing spasms. As evidenced by tight constrictions within the ileal segment, the spasm appeared to involve circular muscle. In ileal segments which were cut longitudinally, maximal responses and the mean concentration required to produce 50% of the maximal response were similar to those obtained in the intact preparation. In cut preparations the maximal responses obtained with choline and TMA were similar to, or greater than, those obtained with intact preparations at 37C after morphine or hexamethonium pretreatment or after cooling to 25C. Hexamethonium or morphine pretreatment did little to enhance maximal responses to choline and TMA in cut preparations. These results suggest that choline and TMA produce differential concentration-dependent effects in the longitudinal and circular muscle coats of guinea-pig ileum. Longitudinal muscle appeared to be the most sensitive to muscarinic receptor stimulation. Higher concentrations were required for stimulation of circular muscle, either directly or indirectly through acetylcholine release.

6371 IMPULSE TRANSMISSION IN THE MYENTERIC PLEXUS-LONGITUDINAL MUSCLE PREPARATION OF THE GUINEA-PIG ILEUM. (E.) Kosterlitz, H. W. (U. Aberdeen Dept. Pharmacol., Scotland) and R. J. Lydon. *Br. J. Pharmacol.* 43(1):74-85, 1971.

The experimental model consisted of a specimen of guinea-pig ileal muscle with the adherent myenteric plexus studied in vitro. Without electrical stimulation, this preparation exhibited spontaneous electrical activity, characteristic of intestinal smooth muscle, which was unaffected by hyoscine or tetrodotoxin, but were abolished by Mn^{++}. After application of a single current pulse of 0.1 Hertz, there was an early action potential, a delay of 200 msec and a complex of biphasic spikes. The first potential was unaffected by Mn^{++} or hyoscine, but was abolished by tetrodotoxin and was thought due to excitation of nerve fibers. The complex of spikes was suppressed by Mn^{++}, hyoscine, epinephrine, and morphine, and was thought to be caused by excitation of smooth muscle. Longitudinal nerves had a mean maximum conduction velocity of 0.65 m/sec, an absolute refractory period of 2.8 msec and a relative refractory period of 20 msec. After stimulation of the nerve with a single pulse, the conduction velocity of the smooth muscle response was 0.16 m/sec. After a single pulse the muscle could not be excited for 0.7 to 1.3 sec, and the delay of transmission from nerve to muscle was 210 msec. With application of a train of 2-5 pulses at 20 msec intervals, all the parameters were increased.

6372 INTESTINAL MOTILITY. I. CONTROL MECHANISMS IN THE BASIC ELECTRIC RHYTHM OF THE CANINE SMALL INTESTINE. (E.) Hiatt, R. B. (Columbia U. Coll. Physicians Surg., New York, N. Y.), I. Goodman, and N. I. A. Overweg. *J. Surg. Res.* 11(9):454-463, 1971.

Electrophysiological studies of the basic electrical rhythm (BER) in the small intestine of anesthetized dogs support the view that a hormone from the bovine posterior pituitary, coherin, is involved in myenteric neuronal activation and the resulting coupling of mechanical and electric activity. Biebl loops of the duodenum, jejunum, and ileum were prepared in 3 female dogs, and electrodes were placed 2 cm apart over a distance of 12 cm. Pacesetter potentials of the BER in the duodenum and jejunum of fasting controls had varied patterns while the ileum rarely had a recognizable BER. Coherin (1 μg/kg i.v.) changed these pacesetter potential patterns to a highly organized cephalocaudad pattern. Serotonin (2 ml of a 10^{-3}M solution), instilled intraluminally in dogs pretreated with coherin produced pacesetter potentials which were simultaneous in each pacesetter complex throughout the duodenum and jejunum. In the ileum of fasting dogs coherin produced an organized pacesetter potential where none had existed before, and serotonin given to coherin-pretreated dogs caused an enormous increase in the electric voltage involved in potential changes and a simultaneous mass spasm synchronous with each electrical cycle. These findings suggest that the pacemaker apparatus manifests itself as an electropositive beat involving different lengths of intestine, depending upon the physiological stimulus, rather than as an anatomically stable focal apparatus.

6373 INTESTINAL MOTILITY. II. ELECTROMOTOR CORRELATIONS IN THE CANINE SMALL INTESTINE. (E.) Hiatt, R. B. (Columbia U. Coll. Physicians Surg., New York, N. Y.), I. Goodman, and N. I. A. Overweg. *J. Surg. Res.* 11(9):464-470, 1971.

The relation between motor activity and electromyographic tracings was studied in vivo in 3 waking dogs with everted loops, which protruded through the abdominal wall during longitudinal muscle relaxation, distal to Biebl loops of the duodenum, jejunum, and ileum about 1 hr after administration of coherin (3 μg/kg i.v.). In the hypermotile state the intestinal musculature was active throughout each cycle of basic electric rhythm. Longitudinal muscles contracted just before or at the onset of pacesetter potentials and terminated just before pacesetter potentials reached a midpoint. Circular muscles contracted just before the midpoint between pacesetter potentials and ended just before the onset of the next pacesetter potential. In some cases maximal rhythmic contraction was not accompanied by any spike activity, and spikes were sometimes observed when there was no muscle activity. Thus, the origin of spikes remains unknown.

6374 EFFECT OF PANCREATECTOMY ON PERISTALSIS IN THE SMALL INTESTINE OF THE DOG. (Rus.) Asadulaev, G. G. (Med. Inst., Kazan, USSR) and Kh. S. Khamitov. *Fiziol. Zh. SSSR* 57(8):1184-1187, 1971.

In fasting dogs with fistulas of the small intestine a study was made of peristalsis in the small intestine with an electrokymograph, and blood cholinesterase (CE) and pseudocholinesterase (PCE) activities were measured before and after removal of 2/3 of the pancreas. Within 5-9 days after pancreatectomy, when CE and PCE activities had decreased significantly, temporary disturbances were found in peristalsis. These disturbances were characterized by a decrease in intestinal motility without any changes in the frequency of the contractions. Peristaltic activity returned to normal 11-12 days after pancreatectomy when CE and PCE activities reached their initial values. It is suggested that peristalsis in the small intestine of the dog is related to the acetylcholine-CE system and that a deficiency in acetylcholine results in disorders in peristalsis.

6375 ALIMENTARY TRANSIT AND SUPERSENSITIVITY AFTER VAGOTOMY IN THE RAT. (E.) Gutierrez, L. V. (C. Argerich Hosp., Buenos Aires, Argentina), N. Kocak, and A. G. Cox. *Gut* 12(8): 625-628, 1971.

The effect of subthreshold doses of carbachol (0.02 µg/kg s.c.) on the denervated stomach and gut was studied in rats before and after vagotomy or pyloromyotomy to determine the effect of surgery on transit through the stomach and small intestine. The rate of gastric emptying was unaffected by pyloromyotomy alone, but 8 days after vagotomy it was significantly reduced and returned to near normal by 30 days. Intestinal transit was decreased at various levels by the surgical procedure. In both control rats and those after pyloromyotomy, the dose of carbachol had no effect on gastric emptying and intestinal transit, thus confirming that the dose was subthreshold. After vagotomy, both early and late, carbachol caused a statistically significant and uniform acceleration of gastric emptying and intestinal transit. The observed results may explain the increased bowel frequency which is commonly encountered after vagotomy.

6376 NORMAL MOTOR ACTIVITY OF THE HUMAN COLON: COMBINED RADIOTELEMETRIC MANOMETRY AND SLOW-FRAME CINEROENTGENOGRAPHY. (E.) Gramiak, R. (U. Rochester Med. Ctr., N. Y.), P. Ross and W. W. Olmsted. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):301-309, 1971.

The relationship between the configuration of the pressure wave and the movements of the walls and contents of the colon under physiological conditions was determined by cineroentgenology in 14 male patients with normal gastrointestinal tracts. The large bowel was active manometrically 24.5% of the time, and peaks represented 65% of the recorded activity with 70% being smaller than 20 cm H_2O in amplitude. The transverse colon showed the greatest frequency of pressure events while amplitude, duration, baseline shifts, and combined peaks of the pressure did not differ significantly in the various colon segments. Cineroentgenologic findings showed narrowing (and some shortening) and were always associated with peak pressure changes followed by visible motor activity, mainly in the transverse colon. Pressure waves of less than 10 sec duration were found in the bowel when no movement was detected cineroentgenologically; these waves are believed to originate outside the colon. Respiratory excursions could be detected mostly in the transverse colon as constant pressure deflections of low amplitude and short duration. Although no correlation was found between the shape of colonic pressure waves and bowel movements which produced the pressure change, slow-frame cineroentgenography was more informative than the pressure record and was less subject to influences originating outside the colon.

6377 PHARMACOLOGICAL FEATURES OF THE GALLBLADDER AND ITS VASCULAR BED OF THE DOG *IN SITU*. (E.) Tamura, K. (Tohoku U. Sch. Med., Sendai, Japan), M. Endoh and K. Hashimoto. *Tohoku J. Exp. Med.* 104(2):157-169, 1971.

In dogs, cholinergic compounds (acetylcholine, bethanechol, carbachol, methacholine, choline, and pilocarpine) administered *via* a cannulated cystic artery all increased the intravesical pressure and caused a marked vasodilation in the vascular bed; vascular effects were shorter in duration than effects on motility. Various active polypeptides (bradykinin, eledosin and kallikrein) and ganglion-stimulating agents (nicotine, lobeline, and tetramethylammonium chloride) contracted the gallbladder and produced vasodilation. Adrenergic compounds (norepinephrine, epinephrine, isoprenaline, dopamine, and tyramine induced gallbladder relaxation and vasoconstriction. Of the polypeptides, lysine vasopressin relaxed the gallbladder, cholecystokinin constricted it, and gastrin and oxytoxin caused no response, while the former constricted the cystic artery and the latter three dilated it. 1,1-Dimethyl-4-piperazinium iodide, serotonin, nicotine, lobeline, angiotensin, and ATP caused a biphasic response, *i.e.*, contraction followed by relaxation or *vice versa*.

6378 THE EFFECT OF VAGOTOMY ON MOTOR FUNCTION OF THE GALLBLADDER. (E.) Isaza, J.

(U. Florida Coll. Med., Gainesville), D. T. Jones, L. R. Dragstedt, and E. R. Woodward. *Surgery* 70(4):616-621, 1971.

The influence of total truncal vagotomy on the motility of the gallbladder stimulated by comparable doses of i.v. cholecystokinin (CCK) and intraduodenal fat was studied in unanesthetized dogs. The amount of water required to bring the intracholecystic pressure up to a base line of 12-16 cm H_2O was about the same after truncal vagotomy as before surgery in 3 of 4 dogs; the other dog had a decreased tonus. When i.v. CCK was used as the stimulant, the time before onset of contraction was essentially the same before and after vagotomy. When intraduodenal olive oil was administered, the time interval before onset of contraction increased after vagotomy in 3 of the 4 animals. When i.v. CCK was used as the stimulant, the time from stimulus to maximum gallbladder pressure was longer after vagotomy than before in 3 of 4 animals. When intraduodenal olive oil was used, the prolongation was more marked and occurred in all 4 dogs. Both stimuli doubled the pressure within the gallbladder and doubling was unaffected by vagotomy. After vagotomy the time interval from discontinuation of the stimulus to return of gallbladder pressure to the base-line level was not altered by CCK stimulation but was prolonged by intraduodenal olive oil. In the dog, vagotomy may delay the release of endogenous CCK from fat in the intestine but does not reduce gallbladder contraction.

6379 DIRECT OBSERVATIONS OF THE CANINE SPHINCTER OF ODDI. (E.) Shore, J. M. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.), A. Silverman, M. Siegel, and M. Bakal. *Ann. Surg.* 174(2):264-273, 1971.

The canine sphincter of Oddi, observed directly through a duodenal cannula under normal anatomic and physiologic conditions, remained constantly closed during the fasting resting phase. Amyl nitrite relaxed the morphinized but not the resting sphincter. Magnesium sulfate, probanthine and isoprenaline did not relax the resting sphincter, but large doses of nitroglycerin (1.2 mg) or dopamine (15 μg/kg/min infused i.v.) relaxed the sphincter of Oddi. Fat in the duodenum always resulted in a prolonged period of sphincter relaxation and bile flow, whereas hydrochloric acid, ethyl alcohol, morphine sulfate and pethidine always produced sphincter spasm, the sphincter being more sensitive to morphine than to pethidine. The sphincter of the pancreatic duct and common bile duct function independently of each other. The potential usefulness of a drug which produces sphincter relaxation under normal physiologic conditions lies in its value in diagnosing the hypertonic sphincter and possible therapeutic use in the management of acute pancreatitis, chronic relapsing pancreatitis or postcholecystectomy biliary colic, when a surgically correctable lesion cannot be found.

6380 SWALLOWING IN THE NEWBORN. (Fr.) Farriaux, J. P. (City Hosp., Lille, France). *Ouest Med.* 24(8):761-776, 1971.

6381 TESTING OF SPASMOLYTIC AGENTS IN MAN BY ESOPHAGEAL MANOMETRY. (Ger.) Niemann, H. (U. Gottingen Radiol. Clin., Germany) and G. Jakob. *Arzneim. Forsch.* 21(8):1217-1221, 1971.

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6385 FUNCTIONAL CLASSIFICATION OF VAGAL AFFERENT DISCHARGES IN THE DOG'S STOMACH. (Jap.) Takeshima, T. (Chiba U. Sch. Med., Japan). *Nippon Heikatsukin Gakkai Zasshi (Jap. J. Smooth Muscle Res.)* 7(1):19-27, 1971.

6386 EFFECT OF VAGOTOMY ON THE ANTRAL MOTOR FUNCTION. (Jap.) Shirahata, K. (Tohoku U. Sch. Med., Sendai, Japan), T. Okabayashi, K. Nagaoka and T. Shiratori. *Nippon Heikatsukin Gakkai Zasshi (Jap. J. Smooth Muscle Res.)* 7(1):28-34, 1971.

6387 FUNCTIONAL DIVISION OF THE HYPOTHALAMUS ACCORDING TO ITS EFFECTS ON GASTRIC MOTILITY. (Fr.) Glavtcheva, L. and V. Velkova. *Rev. Roum. Physiol.* 8(1):73-80, 1971.

6388 THE EFFECT OF CARBOHYDRATE LOADING ON THE MOTILITY OF THE GASTRIC STUMP. (Rus.) Koval, V. P. and I. V. Digai. *Khirurgiia (Mosk.)* 47(3):64-68, 1971.

6389 ACTION OF BRADYKININ-POTENTIATING FACTOR (BPF) AND DIMERCAPROL (BAL) ON THE RESPONSES TO BRADYKININ OF ISOLATED PREPARATIONS OF RAT INTESTINES. (E.) Camargo, A. (Sch. Med., Ribeirao Preto, Brazil.) and S. H. Ferreira. *Br. J. Pharmacol.* 42(2):305-307, 1971.

6390 THE INFLUENCE OF 6-α-METHYLPREDNISOLONE AND OUABAIN ON CONTRACTILE AND RELAXANT RESPONSES OF THE INTESTINAL SMOOTH MUSCLES. (E.) Kostowski, W. (Med. Acad., Dept. Exp. Pharmacol., Warsaw, Poland) and S. Radowicki. *Diss. Pharm. Pharmacol.* 23(3):193-198, 1971.

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6394 PHOTO-OPTICAL OBSERVATIONS ON THE MECHANISM OF DEFECATION IN MAN. (Jap.) Sugisawa, T. (Univ. Sch. Med., Hirosaki, Japan), K. Suzuki and M. Abo. *Nippon Heikatsukin Gakkai Zasshi (Jap. J. Smooth Muscle Res.)* 7(1):45-50, 1971.

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6396 EFFECTS OF CAERULEIN ON THE HUMAN BILIARY TRACT. (E.) Carratu, R. (U. Rome 2nd Med. Clin.), G. Arcangeli and F. Pallone. *R.C. Rom. Gastroenterol.* 3(1):28-33, 1971.

6397 CHOLECYSTOKINETIC ACTIVITY OF A NEW SYNTHETIC CAERULEIN-LIKE HEPTAPEPTIDE IN MAN. (E.) Agosti, A. (U. Parma Inst. Pharmacol., Italy), I. Orlandini and R. De Castiglione. *Experientia* 27(4):412-413, 1971.

See also numbers: 6302, 6530

6398 DETERMINANTS OF SALIVARY RESPONSE TO MECHANICAL STIMULATION. (E.) Blum, A. L. (U. Alabama Med. Ctr., Birmingham) and G. M. Makhlouf. *Gut* 12(8):650-653, 1971.

In contrast to flow rates of whole saliva obtained by simple drainage (3.3-3.7 ml/10 min) in 3 previous large series, flow rates elicited by deliberate mechanical stimulation (suction, cotton rolls, forced spitting) were about twice as high. Provided the stimulus was adequate in this study of 32 healthy subjects, aged 4-38 yr., forced spitting and the cotton roll technique gave rise to similar flow rates. Salivary flow increased in general with age, height, and body weight. The increase in flow with age probably reflected the increase in body weight. Analysis of values by age group disclosed a larger response/kg body weight during periods of rapid growth such as in adolescence and during the first 2 yr of life. This relative increase in response may be attributed to the more rapid growth of internal organs including salivary glands.

6399 ABO BLOOD GROUPS, SECRETOR STATUS, SALIVARY PROTEIN, AND SERUM AND SALIVARY IMMUNOGLOBULIN CONCENTRATIONS. (E.) Waissbluth, J. G. (Univ. Dept. Med., Nottingham, England) and M. J. S. Langman. *Gut* 12(8):646-649, 1971.

Serum and salivary immunoglobulin levels were measured in healthy subjects and correlations were made between ABO blood group and secretor status. Mean total protein concentrations in the saliva were considerably lower in individuals of group O than in those with the other blood groups. Although no correlation was found between serum and salivary protein concentrations, salivary protein concentrations increased with age and were markedly greater in men than women. No clear differences were detected in the serum and salivary concentrations of immunoglobulins in people of the different ABO blood groups. Salivary samples contained a higher proportion of IgA relative to IgG than would have been expected from their respective serum concentrations. No significant differences in the salivary concentrations of IgA were seen in individuals of the different ABO blood groups. Salivary immunoglobulin and total protein concentrations were slightly lower in non-secretors than in secretors, but only IgA levels were significantly different. Serum concentrations of IgA, IgG, and IgM were consistently lower in non-secretors than in secretors, but the differences were not statistically significant.

6400 COMPARATIVE CHARACTERISTICS OF STIMULATED SALIVARY GLAND REGENERATION IN SOME MAMMALS. (Rus.) Ovsepian, A. A. (Inst. Vet. Zootechn., Erevan, USSR). *Biull. Eksp. Biol. Med.* 71(3):98-101, 1971.

STOMACH

6401 A NEW METHOD FOR MEASURING GASTRIC ACID SECRETION IN UNANESTHETIZED RATS. (E.) Borella, L. E. (Ayerst Res. Labs., Montreal, Quebec, Canada) and F. Herr. *Gastroenterology* 61(3):345-356, 1971.

A new technique for studying the physiology and pharmacology of gastric acid secretion is presented which involves the placement of 2 chronic cannulas into the stomachs of rats to allow gastric perfusion after anesthesia. The stomachs were perfused with saline and the perfusate which was collected at 10-min intervals was titrated to determine gastric acid secretions. To study changes in gastric acidity, some animals were perfused with dilute NaOH and the perfusate pH was continuously recorded. The basal acid secretion showed great variation between animals, but in general was much greater in unanesthetized than in urethane-anesthetized animals. Atropine (2.5 μg/kg i.v.) inhibited basal gastric acid secretion. Both urethane (1.5 g/kg i.v.) and phenobarbital (150 mg/kg s.c.) depressed gastric acid secretion. Histamine (2 mg/kg i.v.) was more effective in stimulating gastric acid secretion in unanesthetized animals than in rats under urethane anesthesia. Showing a food pellet to a starved rat caused a significant increase in the rate of gastric acid secretion. This technique allows the accurate measurement of the time of onset and duration of drug action on gastric acid secretion in anesthetized rats.

6402 BACTERIOLOGICAL STUDY OF SALIVARY AND GASTRIC SECRETION. STERILIZING EFFECT

OF HYDROCHLORIC ACID SECRETION. (BASED ON 100 CASES). (Fr.) Levrat, M. (Edouard Herriot Hosp., Lyon, France), R. Truchot, R. de Montgolfier, and A. Moulin. *Arch. Fr. Mal. App. Dig.* 60(6-7): 285-292, 1971.

Bacterial contamination was found in the saliva of all of 100 subjects, but only 10 of 90 subjects had gastric juice with bacterial counts of more than 10^4 after i.m. administration of betazole. All 10 subjects with contaminated gastric juice had betazole-resistant achlorhydria. The organisms most often isolated from both saliva and gastric juice were Escherichia coli, Enterococcus, Candida albicans, and Streptococcus viridans. Gastric juice from all subjects with normal gastric acid secretion or hypochlorhydria was sterile. These findings confirm that hydrochloric acid sterilizes gastric juice.

6403 REDUCTION OF GASTRIC ACID OUTPUT IN RATS BY GLUCOSE. (E.) Thorsøe, H. (Gentofte Hosp., Copenhagen). *Scand. J. Gastroenterol.* 6(4):319-321, 1971.

Wistar rats initially subjected to Shay pyloric ligation were then injected s.c. with either 50% glucose, 6% saline, or 10% saline, all in a volume of 2 ml/100 g. Six hours after injection the abdomens were reopened and the stomach excised. Control rats either received no injection or an injection of 2 ml/100 g isotonic saline. No significant differences were found between stomach weights, pH of gastric contents, and gastric acid outputs, in injected rats and non-injected controls. Compared with controls, rats receiving glucose or 6% or 10% saline had significantly decreased stomach weights and acid outputs and significantly increased gastric pH. The changes were most marked with 10% saline; in these rats the gastric juice contained no free HCl.

6404 EFFECT OF GLUCAGON ON PENTAGASTRIN-INDUCED GASTRIC ACID SECRETION AND MUCOSAL BLOOD FLOW IN THE DOG. (E.) Lin, T.-M. (Lilly Res. Labs., Indianapolis, Ind.) and M. W. Warrick. *Gastroenterology* 61(3):328-331, 1971.

During inhibition of pentagastrin-induced gastric acid secretion the effect of glucagon on gastric mucosal blood flow was studied in dogs with Heidenhain pouches and gastric fistulas. Both secretory rates and acid concentrations were significantly inhibited for up to 3 hr by a single injection of glucagon (50 μg/kg s.c.). In general, the acid concentration in the pouch was decreased to a much greater extent than that in the gastric fistula. Total acid secretion and the mucosal clearance of aminopyrine were both significantly reduced by glucagon, whereas the ratio of aminopyrine concentrations in gastric juice to those in plasma were significantly increased during the periods in which acid secretion was initially inhibited. The maximal inhibition of acid secretion was about 75% in the pouch and 45% in the fistula. Similar results were obtained with i.v. infusion of pentagastrin (1.2 μg/kg/hr). The inhibition of gastric acid secretion by glucagon is probably not due to a decrease in mucosal blood flow, but to the direct action of glucagon on the acid-producing cells.

6405 POTENTIATION OF GASTRIC ACID RESPONSE TO INCREASING DOSES OF PENTAGASTRIN BY SUBTHRESHOLD DOSE OF METACHOLINE IN HEIDENHAIN POUCH DOGS. (E.) Varro, V. (Univ. Med. Sch., Szeged, Hungary), J. Kiss, and M. Mignon. *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):169-174, 1971.

Four dogs with denervated gastric pouches were used to determine the effect of subthreshold doses of methacholine on acid secretion in the presence of pentagastrin. Methacholine (s.c.) significantly increased the acid secretion in response to all doses of pentagastrin that were tested. Greatest potentiation was seen with maximal doses of pentagastrin (1.0 μg/kg/15 min) and amounted to between 0.7451-1.9559 mEq of free HCl/hr. Based on the calculated theoretical maximal acid secretion for both pentagastrin and pentagastrin plus methacholine, the effect of methacholine potentiation was a 5-fold increase in acid secretion. As previously observed with gastrin, maximum acid secretion is a function of the nature and combination of stimulants used.

6406 EFFECT OF CHOLECYSTOKININ ON HISTAMINE- AND PENTAGASTRIN-STIMULATED ACID SECRETION IN CONSCIOUS CATS. (E.) Svensson, S.-O. (Gen. Hosp., Malmo, Sweden) and S. Emås. *Scand. J. Gastroenterol.* 6(5):371-376, 1971.

The effect of rapid i.v. injection of cholecystokinin (CCK) on acid secretion stimulated by continuous i.v. infusion of histamine dihydrochloride (40 or 320 μg/kg/hr) or pentagastrin (4 μg/kg/hr) was studied in cats with gastric fistulas. With a low dose of histamine producing ½ the maximum response, CCK (1 and 20 Ivy dog U/kg) increased acid secretion by 30 and 60%, resp. With a large dose of histamine producing almost maximal response, CCK (20 U/kg) inhibited acid secretion by 25%. Available experimental data suggest that the inhibition of gastrin- or pentagastrin-stimulated acid secretion by CCK is most pronounced in dogs, intermediate in man, and negligible in cats.

6407 THE LONG-TERM STABILITY OF THE INSULIN TEST AFTER PARTIAL VAGOTOMY IN THE DOG. (E.) Spencer, J. (Roy. Postgrad. Med. Sch., London) and G. F. Stening. *Br. J. Surg.* 58(7): 510-512, 1971.

Five dogs with gastric fistulas underwent unilateral cervical vagotomy and lower thoracic vagotomy in an effort to study the gastric response to insulin. During the 6 months after partial vagotomy no decrease occurred in the gastric secretory response to a maximal dose of i.v. histamine. Prior to vagotomy, the mean peak acid output in response to insulin (0.25 -0.50 U/kg) was 8.37 mEq/15 min. During the 6 months after vagotomy, there was no significant change in the peak 15 min acid responses to insulin, except for a small response to low dosages in 4 dogs 6 months after surgery. There was no consistent change during these 6 months in the dose of insulin required to give the highest response. The peak acid output occurred within 1 hr of insulin injection in 88% and 73% of the early tests and 6 month tests, resp. No dose of insulin produced a significant change in the incidence of 1st-hr peak acid responses. These results indicate that in the dog no detectable reinervation occurs during the 6 months after partial vagotomy.

6408 THE EFFECT OF SELECTIVE GASTRIC OR EXTRAGASTRIC VAGOTOMY ON GASTRIC SECRETION IN CONSCIOUS CATS. (E.) Spencer, J. (Roy. Postgrad. Med. Sch., London) and M. I. Grossman. *Br. J. Surg.* 58(7):489-492, 1971.

The effect of selective gastric vagotomy on the response to pentagastrin and histamine in 2 cats with gastric fistulas was that of a decreased mean acid output to all doses of both secretagogues. The mean reductions varied from 17 to 58%, responses to pentagastrin and histamine being equally reduced by vagotomy. There was no tendency for pentagastrin-stimulated secretion to be reduced more by selective gastric vagotomy than was histamine-stimulated secretion; this differs from previously observed dog responses. The maximum response to pentagastrin was not smaller than that to histamine; this also differs from findings in the dog. The mean acid output in response to pentagastrin in 4 cats with both gastric fistula and denervated (Heidenhain) pouches was unchanged after selective extragastric abdominal vagotomy. There is apparently a species difference between the dog and the cat regarding the effects of selective gastric and extragastric vagotomy on gastric acid secretion in response to gastrin.

6409 METHYL HISTAMINES AND GASTRIC SECRETION. (E.) Code, C. F. (Mayo Clin., Rochester, Minn.), S. M. Maslinski, F. Mossini, and H. Navert. *J. Physiol. (Lond.)* 217(3):557-571, 1971.

The effect of histamine N-methylhistamine (MH) and N-dimethylhistamine (DMH) on gastric secretion was studied in dogs and cats with Heidenhain pouches or gastric fistulas. MH (0.25 or 0.5 μM/hr) evoked the production of 1.4-1.6 times as much HCl as equimolar doses of histamine when administered i.v. to cats with gastric fistulas. Smaller doses of MH and DMH than of histamine were required to produce the maximal HCl output in dogs with Heidenhain pouches; however, there was no significant difference between the maximal output induced by the 3 compounds. DMH had a 2-fold greater potency than histamine at a level ½ of the maximal level. When MH and DMH (0.1-1.0 μM/hr) were administered to dogs or cats with gastric fistulas via arteries supplying blood to the stomach or to dogs with Heidenhain pouches via local arteries, both caused production of 4.1-13.9 times as much HCl as equimolar doses of histamine. The HCl response to i.v. administration of histamine or MH was greater when the compounds were injected into the systemic circulation than into the portal circulation of dogs with gastric pouches. Both MH and DMH are more potent gastric acid secretory stimulants than histamine in dogs and cats and may be involved in the normal stimulation of parietal cells.

6410 INHIBITION OF GASTRIC SECRETION BY ATROPINE IN CONSCIOUS RATS. (E.) Johansson, I. (U. Lund Inst. Physiol., Sweden), L. Lundell, and S. E. Svensson. *J. Physiol. (Lond.)* 217(3):723-735, 1971.

The effect of atropine on pepsin and acid secretion, stimulated by feeding, vagus excitation or infusions of methacholine, histamine, or gastrin, was studied in conscious rats with a Pavlov or a Heidenhain pouch. Atropine (100 μg/kg i.v.), injected 30 min after 2-deoxy-D-glucose stimulation, reduced acid and pepsin secretion to preinjection levels for more than 1 hr. Atropine inhibited plateau secretion of acid, obtained by infusion of submaximal doses of hog gastrin II, by about 50% in the Pavlov and the Heidenhain pouches. Atropine also suppressed acid and pepsin secretion in response to food in both the Pavlov (more prolonged) and the Heidenhain pouches. Methacholine-induced acid and pepsin secretion was almost completely inhibited by atropine in the denervated Heidenhain pouch. Atropine reduced histamine-induced acid and pepsin secretion by about 50% for 1 hour. Apparently atropine causes a nonspecific decrease in the responsiveness of the parietal cell to stimulating influences.

6411 USE OF A MICROMETHOD TO STUDY INHIBITION OF PEPSIN PROTEOLYSIS BY HIGH MOLECULAR WEIGHT ANIONS. (Fr.) Andre, C. (Edouard Herriot Hosp., Lyon, France), J. E. Harthill, R. Lambert, and W. Anderson. *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):123-136, 1971.

A micromethod was developed which uses ^{131}I-labeled human serum albumin (RISA) to measure small amounts of pepsin. Pepsin activity was linearly related to RISA concentrations between 250-1000 μg/2 ml for up to 180 min of incubation. High molecular weight anions with a high content of sulfate esters were the most active inhibitors of pepsin, while sulfated and nonsulfated acid glycoproteins and dextran phosphates were less active. No changes occurred in pepsin inhibition over a 3-hr period with inhibitor concentrations as high as 300 µg/2 ml (heparin, chondroitan sulfate, carrageenans) or 400 µg/2 ml (dextran). A decrease in substrate protection with increasing proteolysis times occurred with sulfated and nonsulfated acid glycoproteins, but only nonsulfated acid glycoproteins caused increasing pepsin inhibition with increasing pH. The extent of pepsin inhibition was not changed by addition of the inhibitor before or after the enzyme.

6412 FORMATION OF ALKALI-STABLE PEPSIN COMPLEXES FROM HUMAN GASTRIC JUICE PEPSIN. (E.) Seijffers, M. J. (Hebrew U.-Hadassah Hosp., Jerusalem) and R. Tkatch. *Enzymologia* 41(2):81-90, 1971.

The in vitro formation of human pepsin-pepsin inhibitor (HPPI) complexes from human gastric juice pepsin was investigated in gastric mucosal extracts. Gastric juice lost all proteolytic activity when dialyzed with phosphate buffer but retained its proteolytic activity when mixed with a crude human pepsin inhibitor extract that was previously acidified to pH 1.5, alkalized to pH 12.0, and subsequently neutralized to pH 6.5. The increase in proteolytic activity was linearly related to the volume of the extract used. The residual proteolytic activity of a mixture of 1 ml gastric juice and 1 ml of the extract was approximately 50% of the potential proteolytic activity of the extract. Acidification of the gastric mucosal extract followed by incubation at pH 4.0 resulted in decreased pepsin-inhibitor activity. The milk clotting activity of gastric juice and gastric extracts was absent when dialyzed at pH 7.8, while acidification and incubation at pH 4.0 restored the activity. Acidified combinations of human gastric juice and pepsin inhibitor extract retained their proteolytic activity when dialyzed against phosphate buffer at pH 7.8 for 48 hr at 4C due to the formation of alkali-stable HPPI complexes from the pepsins in gastric juice and the pepsin inhibitor from gastric mucosal extract.

6413 EFFECT OF FOOD ON SERUM GASTRIN EVALUATED BY RADIOIMMUNOASSAY. (E.) Korman, M. G. (Monash U. Dept. Med., Melbourne, Australia), C. Soveny, and J. Hansky. *Gut* 12(8): 619-624, 1971.

The effect of standard meals and individual food constituents on serum immunoreactive gastrin was studied in 23 healthy volunteers with and without prior administration of atropine sulfate (0.6 mg i.m.). Serum gastrin levels were significantly increased after the ingestion of protein, fat, carbohydrate, alcohol, casilan, glycine, and glucose after prior treatment with atropine. Greater increases were observed with fat, alcohol, casilan, and glycine when animals were previously treated with atropine. Neither distilled water nor atropine alone caused any significant alterations in serum gastrin levels. Thus, in normal man, the ingestion of various foods elicits a rise in serum gastrin, probably due to local stimulation of gastrin release. The involvement of a vagal component in this response is indicated by the commencement of the response within 10 min of ingestion.

6414 GASTRIC CLEARANCE OF SERUM ALBUMIN IN NORMAL HUMAN SUBJECTS. (Fr.) Brassinne, A. (U. Liege Inst. Med., Belgium). *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):143-152, 1971.

After i.v. injection of ^{131}-labeled albumin (100 µC), the gastric clearance of serum albumin was measured by gastric intubation in 35 normal subjects before and after stimulation of acid secretion by histamine (0.5 mg s.c.), betazole (100 mg s.c.), insulin (0.15 U/kg i.v.), or pentagastrin (6 µg/kg s.c.). Acidity was neutralized in vivo by perfusing the stomach with a bicarbonate solution containing ^{125}I-labeled albumin so that corrections could be made for escape through the pylorus and for protein digestion. A correction was also made for microscopic bleeding by labeling RBC with ^{59}Fe. Gastric clearance of serum albumin was found to be independent of acid secretion. The normal loss of albumin in the stomach was estimated to be 2.18 g/24 hr, accounting for 13% of the total breakdown of this protein.

6415 EFFECTS OF FOOD INGESTION ON THE CELL PROLIFERATION KINETICS IN THE CANINE FUNDIC MUCOSA. (E.) Willems, G. (St. Pierre Hosp., Brussels, Belgium), Y. Vansteenkiste, and P. Smets. *Gastroenterology* 61(3):323-327, 1971.

The effect of food ingestion on DNA synthesis and mitotic activity was investigated in the fundic mucosa of 4 fasted dogs. After ingestion, mucosal biopsies showed that both the labeling index (% of cells in DNA synthesis) and mitotic index increased in all 4 animals following a lag period of 12 and 20 hr. In fasted animals no correlation was found between labeling and mitotic indexes with the hour of biopsy. The proportion of labeled cells in the glandular site of greatest proliferation to the whole labeled cell population was similar in controls (96.5%) and in specimens taken 16 hr after food ingestion (94.6%). However, in contrast to fasted controls some labeled cells were found in the superficial epithelium of these latter specimens. The height of foveolae decreased greatly after feeding, remained at this level until the 20th hr and almost reached preprandial levels by the 24th hr. Therefore, refeeding of animals after a prolonged fast is followed by a delayed but marked stimulation of cell turnover in the fundic mucosa of dogs.

6416 MODIFIED METHOD FOR THE SIMULTANEOUS DETERMINATION OF SALIVARY AND GASTRIC

SECRETION IN SWINE. (Rus.) Aliev, A. A. (All-Union Inst. Anim. Husband., Moscow) and E. Z. Tkachev. *Fiziol. Zh. SSSR* 57(6):921-922, 1971.

A surgical technique is described for making fistulas in the esophagus and stomach of swine in such a way that the animals can be fed normally and do not require special care. By using this technique it was found that a mean of 296 ± 60 ml of saliva was secreted during a meal and that the mean volume of gastric juice secreted in the first 30 min after the swine began to eat was 102 ± 9 ml. The secretion of gastric juice reached a maximum during the first 5 min and then decreased. The mean amylase activity of the saliva was 179 ± 32 U/ml, and the gastric juice contained consistently high concentrations of pepsin (116 ± 5 Hunt units/ml).

6417 RELATION BETWEEN GASTRIC AND PANCREATIC PROTEASES (ACCORDING TO THE RESULTS OBTAINED FROM HYDROLYZING VARIOUS PROTEINS). (Rus.) Nasledova, N. I. (Inst. Physiol., Novosibirsk, USSR). *Fiziol. Zh. SSSR* 57(8):1178-1183, 1971.

Proteolytic anzyme activity for vegetable (starch) and animal (beef muscle) proteins was measured in homogenates from the gastric mucosa and pancreas of dogs, hedgehogs, a bat, ground squirrels, guinea pigs, and rabbits, and calculations were made of the ratio of vegetable protein (VP) to animal protein (AP) digested. This ratio varied from one species to another. In general, gastric protease hydrolyzed mostly VP, except in the bat and 2 of the 7 hedgehogs. In herbivores pancreatic proteases acted primarily on AP while in carnivores they digested primarily VP. In 1-2-day-old chicks, however, pancreatic protease digested primarily VP, while in chicks fed for 1 month on plant and meat diets, resp., pancreatic protease digested primarily VP and AP, resp. Experiments performed on fasting and non-fasting guinea pigs and rats suggest that there is a direct relation between the production of gastric and pancreatic proteases.

6418 EFFECT OF BORON IN DRINKING WATER ON THE SECRETORY AND DIGESTIVE ACTIVITY OF THE GASTROINTESTINAL TRACT OF DOGS. (Rus.) Khachatrian, T. S. *Gig. Sanit.* 36(1):11-15, 1971.

6419 SECRETORY FUNCTION OF THE FREE GASTRIC TRANSPLANT. (Rus.) Skobelkin, O. K. and M. C. Khovanskaia. *Eksp. Khir. Anesteziol.* 16(1):32-36, 1971.

6420 NEW THIOCARBOXAMIDES DERIVATIVES WITH SPECIFIC GASTRIC ANTISECRETORY PROPERTIES. (E.) Malen, C. E. (Sci. Union, Div. Pharmacol. Res., Suresnes, France), B. H. Danree and X. B. L. Pascaud. *J. Med. Chem.* 14(3):244-246, 1971.

6421 IMMUNOFLUORESCENT STAINING OF THE GASTRIC MUCOSAL GLYCOPROTEIN IN FETAL GUT. (E.) Kawasaki, H. (Univ. Sch. Med., Kurume, Japan), K. Imasato and K. Nakayama. *Kurume Med. J.* 18(2):83-87, 1971.

6422 CYTOCHEMICAL IDENTIFICATION OF "ENDOCRINE" CELLS IN THE GASTRIC MUCOSA OF PATIENTS WITH NORMAL AND ABNORMAL H^+ SECRETION, AND THEIR CORRELATION WITH PARIETAL CELL MASS AND H^+ OUTPUT. (Ger.) Lorenz Meyer, H. (Univ. Med Clin., Marburg/Lahn, Germany), H. Menge and R. Bloch. *Klin. Wochenschr.* 49(11):634-644, 1971.

See also numbers: 6304, 6519, 6524

6423 CHOLESTEROL ESTERASE ACTIVITY OF RAT PANCREATIC JUICE. EFFECT OF pH AND BILE SALT ON THE ENZYME-CATALYSED EQUILIBRIUM STATE. (E.) Filipek-Wender, H. (Med. Sch., Poznan, Poland) and B. Borgström. *Acta Biochim. Pol.* 18(1):1-10, 1971.

Gel-filtration and ion-exchange chromatography failed to separate synthesizing and hydrolysing activities of cholesterol esterase in rat pancreatic juice. Maximum hydrolytic activity against cholesteryl oleate was eluted with anionic proteins in the same tube as the maximum esterifying activity, with an identical distribution around the symmetrical peak. The percent molar composition of cholesteryl ester and free fatty acid at equilibrium, starting either from cholesteryl oleate or from cholesterol and oleic acid at two chosen pH values, was strikingly similar; both were pH-dependent. Low pH values favored formation of cholesteryl ester while high pH values favored the free sterol. At pH 6 the position of the equilibrium in the presence of different bile salts, necessary for the enzyme activity, was very similar: 20% of the cholesteryl moiety was present in the free form and about 80% in the esterified form. Almost 100% fatty acid exchange occurred only with trihydroxy bile salts. The dihydroxy bile salts had a similar but less complete effect. The reaction mechanism is probably similar to that described for pancreatic lipase and is explained by the low water concentration at the site of enzyme action.

6424 THE INTERACTION OF LIPASE, LIPASE COFACTOR AND BILE SALTS IN TRIGLYCERIDE HYDROLYSIS. (E.) Morgan, R. G. H. (U. Western Australia Dept. Physiol., Nedlands) and N. E. Hoffman. *Biochim. Biophys. Acta* 248(1):143-148, 1971.

Sodium taurodeoxycholate strongly inhibited lipase at all bile concentrations above 3 mM in the absence of cofactor. In the presence of cofactor, lipase was stimulated by these concentrations of bile salts. Between concentrations of 1 and 7 mM sodium taurocholate first increased and then decreased lipase activity to the same extent whether or not cofactor was present. Above 7 mM, sodium taurocholate inhibited lipase in the absence of cofactor but stimulated lipase activity in the presence of cofactor. When human lipase and cofactor were used, an essentially similar picture was seen although lipase activity was initially much lower than in experiments with rat juice. Cofactor had no effect on lipolysis if bile salts were absent, but was required for optimal lipolysis in the presence of bile salts above their critical micellar concentration. Cofactor may therefore be of physiological importance in normal fat digestion.

6425 ON THE FUNCTION OF BILE SALTS AND PROTEINS AS COFACTORS OF LIPASE. (E.) Brockerhoff, H. (Fisheries Res. Board. Lab., Halifax, Nova Scotia, Canada). *J. Biol. Chem.* 246(18):5828-5831, 1971.

Pancreatic lipase was rapidly and irreversibly inactivated at a hexadecane-water interphase, and the unfolded protein was very slowly released into the aqueous phase. Sodium deoxycholate (4.5 x 10^{-3} M) and sodium taurocholate (3.6 x 10^{-3} M) both effectively reduced denaturation. Albumin protected the lipase almost as well as bile salts, by unfolding and blocking the interphase. Sodium dodecyl sulfonate did not prevent lipase denaturation. Denaturation of lipase also occurs at the interphase of the substrates, tributyrin or olive oil, and water. Kinetic studies demonstrated that taurocholate and albumin could prevent but could not reverse enzyme unfolding, which may explain the accelerating effect on lipolysis that these agents possess. One of the functions of bile salts and of protein cofactors is to protect the native structure of lipase and to keep the oil-water interphase free from blockage by unfolded proteins. Lipase requires isolation from, rather than binding to, the hydrophobic moieties of its substrates, and it relies on the help of surfactants for the prevention of hydrophobic bonding and unfolding. This interpretation agrees with previous evidence on the lack of lipophilic bonding in the substrate-enzyme complex.

6426 ROLE OF DOPAMINE IN THE SECRETORY MECHANISM OF THE CANINE PANCREAS. (E.) Takeuchi, O. (Tohoku U. Sch. Med., Sendai, Japan), S. Satoh, and K. Hashimoto. *Tohoku J. Exp. Med.* 104(2):203-204, 1971.

The pharmacological effects of L-dopa, dopamine, epinephrine, norepinephrine, isoprenaline and secretin on pancreatic blood supply and secretory activity in dogs was studied in situ by infusion into the pancreas under constant pressure. Dopamine caused a profuse flow of juice with a slight vasoconstriction, depending on the doses ranging from 1-10 µg. In 10 animals the secretory effect of 0.1 U of secretin was roughly equivalent to that of 1-3 µg of dopamine. Unlike dopamine, norepinephrine, epinephrine, and isoprenaline did not elicit a flow of juice: while norepinephrine and epinephrine caused vasoconstriction and isoprenaline caused dilatation. L-Dopa caused a profuse flow of pancreatic juice after a delay of a few minutes. I.v. administration of dopamine clearly induced pancreatic secretion at a dose of 30 µg/kg which is roughly equivalent to 0.3 U/kg of secretin. Dopamine apparently is involved in the secretory mechanism of the canine pancreas.

6427 THE EFFECT OF ADRENALINE AND NORADRENALINE ON THE BLOOD FLOW, ELECTRICAL CONDUCTANCE AND EXTERNAL SECRETION OF THE PANCREAS. (E.) Barlow, T. E. (U. Newcastle upon Tyne Med. Sch., England), J. R. Greenwell, A. A. Harper and T. Scratcherd. *J. Physiol. (Lond.)* 217(3): 665-678, 1971.

Epinephrine or norepinephrine (0.24-40 μg/kg injected i.v. over 2-3 sec) caused biphasic changes in pancreatic transverse electrical conductance which followed a uniform pattern. After a latent period of 5-30 sec there was an initial decrease in conductance followed by a phase of increased conductance. The phase of decreased conductance was associated with a rise in arterial blood pressure, but conduction was still increased when blood pressure had returned to normal. The duration of the phases of the response persisted longer after epinephrine than norepinephrine. Inhibition of the volume rate of secretion always followed a rapid i.v. injection of either catecholamine; inhibition coincided with the phase of decreased conductance and often persisted into the increased conductance phase. Weight for weight, epinephrine produced changes of greater magnitude. The phase of decreased conductance and blood flow was abolished by an α-receptor blocking agent (phenoxybenzamine), and the phase of increased conductance and blood flow by a combination of α- and β-receptor blocking agents (pronetalol and propranolol). Inhibition of secretion occurred after α-receptor blockade in the absence of vasoconstriction, suggesting that the catecholamines have a direct action on the cell.

6428 CORRELATION BETWEEN PANCREATIC SECRETORY FUNCTION AND AGE. II: STUDIES ON STIMULATION WITH PANCREOZYMIN AND SECRETIN. (Cz.) Bartos, V. (Charles U. 1st Intern. Dis. Clin., Hradec Kralove, Czechoslovakia) and J. Groh. *Lek. Zpr. Kekfak. Karlovy Univ.* 16(3-4):51-62, 1971.

6429 EXPERIMENTAL ANALYSIS OF SO-CALLED PANCREATIC REGENERATION. (Fr.) Mallet Guy, P., J. Brunon and J. Feroldi. *Lyon Chir.* 67(1):39-46, 1971.

6430 CHANGES IN THE VOLUME OF BODY FLUIDS IN RATS WITH EXPERIMENTAL PANCREATITIS. (Rus.) Lavrova, Z. S. (Inst. Exp. Med., Leningrad, USSR). *Biull. Eksp. Biol. Med.* 71(5):47-48, 1971.

6431 SOME INDICES OF PANCREATIC FUNCTION AFTER DUODENECTOMY AND RESECTION OF THE SMALL AND LARGE INTESTINE. (Rus.) Martov, I. B. *Zdravookhr. Beloruss.* 17(2):13-15, 1971.

See also numbers: 6304, 6374, 6417, 7089

6432 PROTECTIVE ACTION OF THE ASPARTIC ACID ON LIVER STEROID DEHYDROGENASES IN EXPERIMENTAL CHRONIC INTOXICATION WITH CARBON TETRACHLORIDE. (E.) Fodor, O. (Inst. Public Health Med. Res., Cluj, Rumania), D. Tapalaga, and F. Barbarino. *Acta Gastroenterol. Belg.* 34(6):447-454, 1971.

The effect of aspartic acid on liver steroid dehydrogenases was studied in male rats after administration of CCl_4 (0.1 ml/kg i.m. 4 times a week) for 6 weeks. In CCl_4-treated rats all the reactions for steroid dehydrogenases became negative in a relatively large zone radiating from the center of the lobule, in some cells of the intermediary zone, and along some stripes passing through the hepatic tissue. Aspartic (0.5 ml of a 5% solution administered i.p. with the CCl_4) exerted a protective effect over the steroid dehydrogenases as indicated by a less negative response of the hepatic parenchymal cells. Aspartic acid also protected several other dehydrogenase reactions, including NADH -diaphorase, glucose-6-phosphatase and membrane ATP-ase. The protective effect of the aspartic acid on these enzymes corresponded to the limitation of structural lesions (necrosis, vascuolar dystrophy and connective tissue proliferation) and with the conservation of the hepatocellular glycogen and ribosomal RNA. Thus, therapeutic administration of aspartic acid may be justified by its correcting effect on the metabolism of the steroid hormones.

6433 CARBON TETRACHLORIDE HEPATOTOXICITY IN FEMALE RATS. (E.) Srinivasan, S. (Case Western Reserve U. Sch. Med., Cleveland) and R. O. Recknagel. *Exp. Mol. Pathol.* 15(2): 268-270, 1971.

CCl_4 (5 ml/kg) was administered by stomach tube to female rats and after 3 hr conjugated diene absorption was monitored in hepatic microsomal lipids and hepatic neutral lipids were quantitatively measured. A significant elevation in the UV spectra was observed for CCl_4-treated rats in the region from 225-250 mμ. The difference spectrum obtained from the spectrophotometric analysis of liver microsomal lipids (CCl_4-poisoned minus controls) showed a typical conjugated diene absorption maximum. The hepatic neutral lipid content increased markedly within 3 hr after CCl_4 administration (77.62 vs. 42.07 mg/liver/100 g body weight). At one hour after CCl_4 administration, differences in the optical density which almost completely disappeared after 24 hr indicated rapid onset of microsomal lipid peroxidation. Thus, CCl_4 seems to induce the rapid onset of peroxidative lipid decomposition in the liver endoplasmic reticulum of female rats, as it does in the male rat.

6434 SIMPLIFIED METHOD FOR ISOLATION OF INTACT AVIAN AND RAT LIVER PARENCHYMAL CELLS. (E.) Capuzzi, D. M. (Johns Hopkins U. Sch. Med., Baltimore, Md.), V. Rothman, and S. Margolis. *Biochem. Biophys. Res. Commun.* 45(2):421-429, 1971.

The livers of anesthetized young white rock cockerels and male Sprague-Dawley rats were perfused for 15 min in situ through the portal vein with a collagenase and hyaluronidase solution, minced, and then incubated in the enzyme solution. The recovery of liver cells was 40 to 60% with a range of 2.4-3.5 x 10^6 cells/ml (cockerel liver) and 0.75-1.25 x 10^6 cells/ml (rat liver) when diluted 1:40 with incubation medium. Most of the cells excluded nigrosin dye for the first 3 days in culture and 50% were not damaged as viewed by the electron microscope. Incorporation of ^{14}C-acetate by cockerel hepatocytes was very rapid for 60 min and reached a plateau by 120 min. The linear period of acetate incorporation was not prolonged by a 10-fold increase in acetate concentration. Lipids were synthesized in cockerel livers of 3 to 4 days with the initial rate declining after the first 24 hr. ^{14}C-serine incorporation into cockerel cellular protein was markedly higher when cells were incubated in simple (HCO_3^--free Hank's solution) rather than complex medium containing 10% chicken serum but after 72 hr of incubation the rate of incorporation was about the same in simple and complex medium. The effects of insulin and 3',5'-cyclic AMP on hepatocyte lipid synthesis were compatible with results obtained in liver perfusion and slice experiments. This technique may be useful for in vitro study of physiological regulatory mechanisms.

6435 A RELIABLE INDEX OF TISSUE METABOLIC ACTIVITY DURING THE INITIAL PHASE OF RAT LIVER REGENERATION. (E.) Menyhárt, J. (Semmelweis U. Med., Budapest, Hungary), Á. Horváth, and A. Rosta. *Acta Biochim. Biophys. Acad. Sci. Hung.* 6(2):139-144, 1971.

Anaerobic glycolytic potential, chemical composition, and oxygen consumption of regenerating rat liver tissues were studied following 2/3 partial hepatectomy. During the initial phase of rat liver regeneration (12-24 hr), the dry matter content of the tissue increased, protein content decreased, lipid content increased 4-fold, and glycogen decreased almost to zero. Lipids, accounting for about 15% of the dry material of normal liver, amounted to about 50% of the dry matter in the regenerating liver. Since there is a change in dry matter composition, the conventional Q-value (metabolic activity/mg dry matter/hr) is not a valid index of tissue metabolic activity during liver regeneration, whereas the specific metabolic activity is more reliable. Specific metabolic activity is essentially identical with the conventional Q value with the exception that protein content instead of dry weight is used as a reference in the calculations.

6436 UREA PRODUCTION BY RAT LIVER SLICES AT VARIOUS UREA CONCENTRATIONS IN THE MEDIUM. SHORT COMMUNICATION. (E.) Menyhárt, J. (Semmelweis U. Med., Budapest), Á. Horváth, and A. Rosta. *Acta Biochim. Biophys. Acad. Sci. Hung.* 6(2):145-147, 1971.

Urea production was measured in rat liver slices (from which preformed urea had been washed out) incubated in a medium containing various concentrations of urea. Urea synthesis was determined manometrically by measuring CO_2 liberated by urease. Urea production was 24.3 μliters of urea-CO_2 in the cases of slices incubated in the absence of urea, while it was 9.1 μliters of urea-CO_2 in the presence of 3.3 mM urea and 1.1 μliters of urea-CO_2 in the presence of 33.0 mM urea. The rate of urea synthesis (Qurea) expressed as μl of urea-CO_2 liberated/mg dry weight/hr, decreased with increasing concentration of urea in the medium: from a mean value of 1.927 with no exogenous urea to 1.20 with 3.3 mM urea, 0.618 with 6.6 mM urea, 0.240 with 19.8 mM urea and 0.028 with 33.0 mM urea (frequently with no urea production in the presence of 33.0 mM urea). These findings indicate that the urea concentration in the medium has a regulatory effect on the rate of urea synthesis by liver slices.

6437 THE FORMATION AND METABOLISM OF 3α,7α-DIHYDROXY-5β-CHOLESTAN-26-OIC IN MAN. (E.) Hanson, R. F. (U. Minnesota Dept. Med., Minneapolis). *J. Clin. Invest.* 50(10):2051-2055, 1971.

The formation and metabolism of 3α,7α-dihydroxy-5β-cholestan-26-oic acid (DHCA), a naturally occurring C_{27} bile acid, was studied in 3 patients with T-tube bile fistulas made 10-14 days previously during cholecystectomy for cholelithiasis. When C-26-cholesterol-^{14}C was administered i.v., less than 1% of the administered ^{14}C was converted to DHCA. Administration (p.o. or i.v.) of DHCA was followed by the conversion of about 80% of this C_{27} bile acid to chenodeoxycholic acid and less than 2% to cholic acid. Two unidentified peaks, one of which had a chromatographic mobility slightly more polar than DHCA, contained the other metabolites of DHCA. Thus, DHCA seems to be an intermediate in C_{24} bile acid synthesis from cholesterol in man.

6438 LIVER PARENCHYMAL CELL INJURY. VII. MEMBRANE DENATURATION FOLLOWING CARBON TETRACHLORIDE. (E.) Reynolds, E. S. (Peter Bent Brigham Hosp., Boston, Mass.) and H. J. Ree. *Lab. Invest.* 25(3):269-278, 1971.

The early time course of changes involving the endoplasmic reticulum (ER) of the liver parenchymal cell was studied in male rats after administration of CCl_4 (2.6 mM p.o. through a stomach tube). Within ½ hour increased masses of smooth-surfaced tubules, resembling smooth ER, were recognized in centrolobular cells and by 1 hour these enlarging masses formed discrete labyrinthine tubular aggregates which displaced mitochondria and microbodies to their periphery. Diameters of tubular profiles in labyrinthine tubular aggregates decreased with time as they condensed into more tightly woven snarls and electron-opaque deposits applied to the outer surfaces of their tubular profiles increased. Nonvolatile ^{14}C derived from $^{14}CCl_4$ was recovered from chemical constituents of liver homogenates and subcellular fractions within 15 minutes following poisoning. The patterns of ^{14}C recovery were remarkably constant up to 4 hours after poisoning. Within 15 minutes of CCl4 administration, oxidative demethylation of antipyrine was decreased 1/3, diene conjugate contents of microsomal lipids almost tripled, and the absorption spectrum of cytochrome P-450 was diminished. Cell sap RNA content increased and amino acid incorporation into microsomal protein decreased significantly by 1 hour after poisoning. ^{14}CCl4 binding and lipid diene conjugation did not vary with the dose or degree of injury.

6439 DIFFERENCES IN THE BEHAVIOR OF GLUCOSE-FORMING AMINO ACID ENZYMES IN RAT LIVER. (Ger.) Schmidinger, H. (Univ. Med. Clin., Tubingen, Germany), I. Thedering, P. Sommer and H.-F. v. Oldershausen. *Klin. Wochenschr.* 49(17):992-993, 1971.

After 38 hr of fasting glutamic-oxaloacetic transaminase (GOT) and serine dehydratase, but not glutamic-pyruvic transaminase (GPT), were induced in the livers of rats fed a protein-free diet for 5 days. The activity of GPT increased only after 48 hr of fasting to twice that found in control rats fed a protein-free diet; GOT activities did not differ appreciably from control values at this time. After 72 hr of fasting GOT and GPT activities were about 4 times higher than in controls and serine dehydratase activities were 10 times higher. Serine dehydratase activities were completely suppressed by giving the rats a 4% glucose solution for 3 days in place of water; GOT and GPT activities were only partially suppressed.

6440 REGULATION OF HEPATIC ELIMINATION OF ETHANOL IN VIVO. (E.) Hillbom, M. E. (State Alcohol Monopoly Res. Labs., Helsinki). *FEBS Lett.* 17(2):303-305, 1971.

The relation between hepatic ethanol catabolism and the redox state of the liver in vivo was studied in male Wistar rats. Ethanol catabolism was increased by both clofibrate (2 mg/kg/day s.c.) and promethazine chloride (0.25 mg/kg/day i.p.), but neither drug affected liver alcohol-NAD oxidoreductase (ADH) activity. Ethanol catabolism was markedly reduced by propylthiouracil (0.5 mg/kg/day p.o. through a stomach tube) and was almost completely prevented by simultaneous administration of propylthiouracil and promethazine. However, combined treatment did not reduce the propylthiouracil-induced increase in liver ADH activity. Although there was no correlation between ethanol catabolism and ADH activity, a significant negative correlation was found between individual values of ethanol catabolism and the lactate/pyruvate ratios found in hepatic venous blood during ethanol metabolism. The cytoplasmic redox state of the liver seems to be important in hepatic ethanol catabolism in vivo, and liver ADH activity appears to be of minor importance when it is normal or increased.

6441 STIMULATION OF HEPATIC PROTEIN SYNTHESIS IN RATS FED AN ADEQUATE PROTEIN DIET AFTER A LOW PROTEIN DIET. (E.) Horie, Y. (Nagoya City Coll. Nutr., Lab., Japan) and K. Ashida. *J. Nutr.* 101(10):1319-1325, 1971.

Rats fed a 25% casein diet for 7 days showed a 4.2% increase in body weight and an 8.2% increase in liver weight in one day, whereas animals fed a 5% casein diet for 7 days and then a 25% casein diet for 1 day showed a 9.5% increase in body weight and a 43% increase in liver weight on that last day. Contents of both total nitrogen and trichloroacetic acid-insoluble nitrogen in the liver increased more than 5 times as rapidly in rats given a 25% casein diet after protein deficiency than in controls. The increase in total nitrogen was caused by an increase in trichloroacetic acid-insoluble nitrogen, probably largely protein nitrogen. The incorporation of ^{14}C-lysine into liver slices was greater in the experimental group after the 25% casein diet was begun. Thus, hepatic protein synthesis was greater in animals on changing from a 5% to a 25% casein diet. Leucyl RNA synthetase had a higher activity in rats fed a 5% casein diet for 7 days than in those fed a 25% casein diet for 7 days. The more rapid increase in liver protein in the experimental group may be due to enhanced aminoacyl RNA synthetase activity.

6442 INFLUENCE OF PHENOBARBITAL ON HISTOLOGICAL AND BIOCHEMICAL CHANGES IN EXPERIMENTAL INTRAHEPATIC CHOLESTASIS. (E.) Horký, J. (British Indust. Biol. Res. Assoc., Carshalton, Surrey, England), P. Grasso, and L. Golberg. *Exp. Pathol. (Jena)* 5(3-4):200-211, 1971.

Functional and structural changes resulting from α-naphthylisothiocyanate (ANIT)-induced intrahepatic cholestasis and the effects of increased liver microsomal enzyme activities were studied in Wistar rats with and and without phenobarbital pretreatment (60 mg/kg i.p. twice a day for 3 days). Within 24 hr after administration of a single dose of ANIT (10-80 mg/kg p.o. through a stomach tube), histological changes appeared, the extent and severity of which increased with increasing doses of ANIT. Large doses of ANIT (80 mg/kg) without phenobarbital pretreatment produced severe necrosis of the bile duct epithelium with infiltration and involvement of bile ductules. Phenobarbital pretreatment caused even more severe damage and affected more animals treated with lower doses of ANIT. In pretreated rats the damage produced by 40 mg/kg ANIT was equivalent to that produced by 80 mg/kg ANIT in non-pretreated rats. Phenobarbital pretreatment produced increases in total serum bilirubin much sooner than in rats given ANIT alone. Good correlation was found between total and direct serum bilirubin levels and the extent of histological changes in the portal bile ducts, while the correlation between bilirubin values and the extent of portal infiltration or bile ductule changes were not as close. The effects of phenobarbital pretreatment are attributed to its activation of microsomal liver enzymes and to its acceleration of ANIT breakdown into toxic metabolites, the concentration of which increases in the bile ducts because of increased bile flow.

6443 ARGINASE ACTIVITY OF MOUSE SERUM AND LIVER TISSUE IN SOME CONDITIONS OF EXPERIMENTAL LIVER DAMAGE. (E.) Cacciatore, L. (U. Naples Inst. Intern. Med., Italy) and S. Antoniello. *Enzymologia* 41(2):112-120, 1971.

Arginase activity in acute toxic and infectious liver diseases was studied in Swiss albino mice. A highly significant increase in SGPT and serum arginase activities was found in mice infected i.p. with MHV-3 virus or poisoned with CCl_4 (0.01 ml/g of a 10% solution i.p.). Although in both conditions a marked decrease in liver arginase activity was observed, statistical evaluation showed that there was a good correlation between increased serum arginase activity and decreased liver arginase activity. However, the regression between these parameters is only partly representable by a linear-type regression. In these liver conditions passage of the necrotic liver cell enzymes into the blood is apparently subject to more than two variables, and therefore better represented by a multiple-type regression.

6444 THE EFFECT OF ANEMIA ON PORPHYRIN SYNTHESIS IN MOUSE LIVER. (E.) Simons, J. A. (Coll. William and Mary, Williamsburg, Va.). *Biochem. Med.* 5(5):425-429, 1971.

The effect of anemia on the regulation of hepatic porphyrin synthesis was assessed by comparing the activity of δ-aminolevulinic acid (ALA) synthetase and the overall prophyrin-synthesizing capacities of the livers of normal mice and mice with congenital anemia. ALA synthetase activity was the same in both anemic and normal mice, although anemic mice had enlarged livers, and therefore a greater total production of ALA. The capacity of the livers of anemic mice to synthesize protoporphyrin from ALA was increased by 40%. In addition, coproporphyrin and protoporphyrin synthesis from ALA was also increased in the livers of mice with phenylhydrazine-induced hemolytic anemia. The increased porphyrin synthesizing capacity of congenitally anemic mice apparently does not result from a pleiotropic effect of the mutant gene since it also occurred in normal mice with drug-induced hemolytic anemia.

6445 ACID LIPASE IN FATTY LIVER IN RATS. (E.) Bar-On, H. (Hadassah U. Hosp., Jerusalem, Israel), O. Stein, and Y. Stein. *Isr. J. Med. Sci.* 7(4):568-576, 1971.

The possible role of a hepatic lipase in regulation of the size of the large triglyceride compartment was evaluated in rats. Electron micrographs of hepatic "floating fat" (fat floating up during the sedimentation of mitochondria) revealed the presence of vesicles, free and attached to the lipid droplets, as well as some dense bodies containing electron-translucent vacuoles which resembled lysosomes in intact liver cells. Acetone-extracts of rat liver homogenates had lipolytic activity towards triolein, with a pH optimum of 4.6. Both acid phosphatase and acid lipase were concentrated mostly in the lysosome-rich fraction. The acid lipase activity was lower and the triglyceride content was higher in livers of rats fed a high-fat, choline-deficient diet. A lower acid lipase activity was also seen in rats fed a high-fat diet, supplemented with choline. In livers of rats fasted for 21 hr or fed a high-fat diet, with or without the addition of choline, acid lipase activity, when tested in the presence of added triglyceride, was lower than in rats fed a control diet or in fasted rats given a single intoxicating dose of ethanol. However, activity towards endogenous substrate was somewhat higher in liver with higher lipid content, whether due to a high-fat, choline-deficient diet or to ethanol.

6446 EXCRETION OF NITROFURANTOIN IN DOG HEPATIC BILE. (E.) Conklin, J. D. (Norwich Pharm. Co., N. Y.) and D. L. Wagner. *Br. J. Pharmacol.* 43(1):140-150, 1971.

The femoral veins of adult male beagle dogs were cannulated for the collection of blood and administration of nitrofurantoin sodium, and each ureter was cannulated about 6-8 cm from the hilus of the kidney. After ligation of the cystic duct at the common bile duct and emptying of the gallbladder, the common bile duct was cannulated about 4-6 cm from its junction with the cystic duct and the main hepatic duct. Nitrofurantoin sodium was administered as a single i.v. injection (0.04-24.0 mg/kg) or by i.v. infusion (1.5 mg/kg/hr). After i.v. injection the bile:blood ratio of the drug was 200:1. Biliary excretion of nitrofurantoin and its hydrochloretic effect were linearly related to drug doses between 1.5-12.0 mg/kg. The maximum increases in hepatic bile flow were 5-10 ml/0.5 hr. Saturation of the biliary excretion system and the hydrochloretic mechanism occurred at 24.0 mg/kg, while the urinary excretion system was saturated at 6.0 mg/kg. With doses of 1.5-6.0 mg/kg, recovery of drug in bile ranged from 16.5%-22.6% and in the urine, from 24.1-36.2%. In dogs with CCl_4-induced hepatic damage, after i.v. nitrofurantoin the drug excretion in the bile was 10% of that in controls and the hydrochloretic effect was about 20%.

6447 THE EFFECTS OF SOME STIMULATORS (INDUCERS) OF HEPATIC MICROSOMAL DRUG-METABOLIZING ENZYME ACTIVITY ON SUBSTRATE-INDUCED DIFFERENCE SPECTRA IN RAT LIVER MICROSOMES. (E.) Kutt, H. L. Waters, and J. R. Fouts (U. Iowa Coll. Med., Iowa City). *J. Pharmacol. Exp. Ther.* 179(1):101-113, 1971.

A comparison was made between the effects of *in vivo* treatment with and *in vitro* addition of *enzyme* inducers (diphenylhydantoin, phenobarbital, DDT, or 3-methylcholanthrene) on UV difference spectra of rat liver microsomes with ligands of different binding strengths. Most of the results could be explained by interactions between ligands competing for microsomal binding sites. More strongly binding ligands (benzphetamine or aniline) could displace the weaker binding ligands (diphenylhydantoin or phenobarbital). In microsomes from the 3-methylcholanthrene-treated rat simple competition between aniline and residual 3-methylcholanthrene for binding sites could not explain all the results, although that can explain the interaction of type I ligands (*e.g.*, benzphetamine) and microsomes from 3-methylcholanthrene-treated rats. Many changes in microsomal difference spectra that appear to result from enzyme induction may be associated with the presence of residual inducer in these microsomes. Comparatively high concentrations of phenobarbital and diphenylhydantoin had to be added *in vitro* to suspensions of hepatic microsomes *in order* to obtain concentrations comparable to those in microsomes from animals treated *in vivo* with phenobarbital or diphenylhydantoin.

6448 BILIARY EXCRETION OF BARBITURATES. (E.) Klaassen, C. D. (U. Kansas Med. Ctr., Kansas City). *Br. J. Pharmacol.* 43(1):161-166, 1971.

Experimental animals consisted of Simonsen Sprague-Dawley rats prepared with cannulae in the femoral vein and artery for infusion of barbiturate and sampling of blood, respectively. Probenecid (32 mg/kg i.v.) was administered immediately before pentobarbital sodium (35 mg/kg i.v.) or phenobarbital sodium (75 mg/kg); blood samples were taken after 2-360 min and bile samples after 15-360 min. Both barbiturates were excreted into the bile. The concentration of pentobarbital and/or its metabolites was 22 times higher in bile than in plasma, while the concentration of phenobarbital and/or its metabolites was 10 times higher in bile than in plasma. The biliary excretion of these barbiturates was significattly less in probenecid-treated rats than in controls. The total 6-hr biliary excretion was 28% of the injected dose of pentobarbital and 18% of the injected dose of phenobarbital. The biliary excretion products consisted mainly of polar metabolites of the barbiturates rather than the parent compounds themselves.

6449 PHARMACOKINETIC MODEL FOR THE SUCCESSIVE DEMETHYLATION AND BILIARY SECRETION OF METHYL ORANGE IN THE RAT. (E.) O'Reilly, W. J. (U. Manitoba Fac. Pharm., Winnipeg, Canada), P. A. Pitt, and A. J. Ryan. *Br. J. Pharmacol.* 43(1): 167-179, 1971.

White male rats were cannulated to permit collection of bile, 2 mg of ^{3}H-labeled methyl orange was injected i.v. via a femoral vein, and bile was collected hourly for 6 hrs. Free methyl orange and its metabolites (4'-sulpho-4-methylaminoazobenzene and 4'-sulpho-4-aminoazobenzene) were separated and assayed by thin-layer chromatography and scintillation counting. Graphical and digital computer analysis were used to derive the first-order rate constants for the successive demethylation steps in the metabolism of this dye. The rate constants for removal of the first and second methyl groups were 0.684 and 1.000/hr, resp. The rate constants for biliary excretion of the parent compound, the monomethyl derivative, and the demethylated metabolite were 0.164, 0.672 and 6.413/hr, resp.

6450 MEASURING THE EFFECT OF CHOLERETIC AGENTS IN MAN. (Ger.) Maurer, C. (Univ. Surg. Clin., Heidelberg, Germany). *Arzneim. Forsch.* 21(9):1375-1379, 1971.

The effect of dehydrocholic acid sodium (DCA; 1.5 g i.v.) on bile flow was studied in 12 patients 6-7 days after cholecystectomy and bile duct surgery for cholecystolithiasis and choledocholithiasis; none of these patients had dilated bile ducts nor bile regurgitation at surgery, and none of them developed complications after surgery. DCA significantly increased the volume and the total solids in bile and decreased its osmolality. Chloride output increased significantly but chloride concentrations remained essentially unchanged. DCA inhibited bilirubin secretion and significantly increased bile acid secretion. With the enzymatic methods employed in this study no information was obtained about the kind of bile acids present in the bile, but it is still possible that DCA stimulates endogenous bile acid synthesis and secretion. This is suggested from the decrease in osmolality which cannot be explained by a slight decrease in electrolytes but may be caused by the formation of polyionic aggregates of bile acids.

6451 EFFECT OF SOME STEROID HORMONES ON RAT LIVER ASPARAGINASE. (It.) Campisi, R. (U. Palermo Inst. Chem. Biol., Italy), C. Nicotra, and M. A. Livrea. *Boll. Soc. Ital. Biol. Sper.* 47(10):294-296, 1971.

When administered for 3 days in doses of 500 µg/kg/day to female Wistar rats, estradiol, estrone, estriol, and pregnanediol caused a moderate decrease in L-asparaginase activity in the liver. However, when administered for a week, these hormones, particularly estradiol, caused a significant decrease in liver L-asparaginase activity. Progesterone had no effect. A moderate decrease in L-asparaginase activity also occurred when estradiol was given to oophorectomized rats over a long period. On the basis of these findings, it is suggested that some steroid hormones play an important role in regulating the activity of L-asparaginase in the liver during pregnancy.

6452 EFFECTS OF ALTERATION OF BILIARY PRESSURE ON BILE COMPOSITION - A METHOD FOR STUDY: PRIMATE BILIARY PHYSIOLOGY V. (E.) Strasberg, S. M., B. C. Dorn, R. N. Redinger, D. M. Small, and R. H. Egdahl (750 Harrison Ave., Boston, Mass.). *Gastroenterology* 61(3):357-362, 1971.

A new technique is described for inducing and maintaining different bile duct pressures while simultaneously collecting bile during controlled interruption of the enterohepatic circulation in rhesus monkeys. Using a T-tube which was placed in the common bile duct with the 2 limbs exteriorized, the bile was diverted through one limb while common duct pressure was measured by a pressure transducer in the other limb. Using a "stream-splitter" which collected a percentage of the diverted bile and returned the rest by a tube duodenostomy, control of enterohepatic circulation was achieved. Using this technique it was possible to induce and maintain common bile duct pressures from -10 to +25 cm of saline. In 3 animals studied, increased intraductal pressures resulted in alterations in bile flow and the secretion of bile salts, phospholipids, and cholesterol into the bile.

6453 PORTAL VENOUS INJECTION IN THE RAT. (E.) Blumgart, L. H. (Welsh Natl. Sch. Med., Cardiff), K. G. Leach, M. S. F. McLachlan, S. Seager and C. J. Ryan. *Gut* 12(7): 585-591, 1971.

A new method for s.c. transposition of the spleen was used in 16 male rats in an attempt to develop a reliable means of transplenic portal injection. All the animals tolerated the operative procedures well and all survived. Splenic clearance studies with xenon, pertechnetate, and albumin injected intrasplenically revealed that they were all cleared and did not pool in the organ. Six of the 14 rats operated on from 18 days to 4 weeks previously had axillary collateral circulation and 10 had collateral vessels to the groin demonstrated by splenoportography. Using isotopes, collateral vessels to the groin were demonstrated in 12 of the 14 animals. The presence of groin collaterals was a reliable indication that porta-systemic communications existed. All animals, including those in whom partial hepatectomy was performed, tolerated portal infusions of fresh rat serum of large volume as early as 1 day after operation. A simple means of porta-systemic diversion can be accomplished by tying the portal vein above its splenic tributary when adequate porta-systemic venous connections are present.

6454 MICELLAR PROPERTIES OF SODIUM FUSIDATE, A STEROID ANTIBIOTIC STRUCTURALLY RESEMBLING THE BILE SALTS.

(E.) Carey, M. C., and D. M. Small (Boston U. Sch. Med., Mass.). *J. Lipid Res.* 12(5):604-613, 1971.

Sodium fusidate is a fungal metabolite isolated from the fermentation products of Fusidium coccineum and is biologically active against the penicillinase-producing strains of Staphylococcus aureus. Depending upon the method of measurement, temperature, and counterion concentration, the critical micellar concentrations of this tetracyclic triterpene (1.44-4.56 mM), were similar to those of sodium taurocholate. Essentially no counterions bound to the fusidate micelles in water. The critical micellar concentration was lowest at 20° C. Entropy was responsible for micelle formation at 10° and 20° C, while enthalpy was responsible at 30° and 40° C. Calculated from surface tension measurements, the mean molecular area of sodium fusidate was calculated at 101 Å^{2} compared with 88 Å^{2} for sodium taurocholate. Both molecules were found to lie with their longitudinal axis parallel to an air-water interface. The apparent aggregation number of fusidate micelles increased from 5 to 16 as the counterion concentration increased from 0.01 to 0.60 M Na^{+}, compared with a range of 3 to 9 for taurocholate. The saturation ratios were similar when liquid crystalline suspensions of lecithin or monoglyceride were solubilized by solutions of fusidate or taurocholate. Orally administered fusidate is also excreted mainly via the biliary tract.

6455 BILIRUBIN OUTPUT AND CLEARANCE IN ISOLATED DOG LIVER PERFUSION.

(E.) Royer, M. (Natl. Inst. Health, Haedo, Argentina) and G. Ortiz. *Acta Hepatosplenol. (Stuttg.)* 18(4):312-320, 1971.

Initial increases in bilirubin concentration and output in the bile were comparatively lower when large amounts of unconjugated bilirubin (10 mg) were added to a dog liver perfusion medium than when smaller amounts were used. When unconjugated bilirubin and glucuronic acid were added to the perfusion medium, the bilirubin concentration increased only 118% compared with 475% when only bilirubin was perfused at the same dose; the yield was also lower. After 30 min the hepatic bilirubin clearance was much lower than when bilirubin was perfused alone. The administration of uridine di-phosphoglucuronic acid with 3 mg of unconjugated bilirubin led to an increased concentration and a yield higher than when the same dose of bilirubin was infused alone. One mg conjugated bilirubin per 100 g liver gave a lower increase of concentration, output and yield than the same dose of unconjugated pigment. Increase of concentrations output and yield were higher after infusion of unconjugated bilirubin through hepatic artery than when the same dose of pigment was administered through the general circulation. The clearance curve was also very high.

6456 EFFECT OF CARBON TETRACHLORIDE INDUCED PROGRESSIVE LIVER DAMAGE ON THE METABOLISM OF HEXOBARBITAL AND BILIRUBIN IN VIVO.

(E.) Vorne, M. (U. Oulu Dept. Pharmacol., Finland) and M. Alavaikko. *Acta Pharmacol. Toxicol. (Kbh.)* 29(5-6):402-416, 1971.

The development of liver changes were observed from histological specimens for rats given 2 ml carbon tetrachloride s.c. 3 times/week. Changes in liver function capacity were determined after carbon tetrachloride administration for 2,4,8, and 16 weeks by measuring the hexobarbital sleepin time and the retention of bilirubin. Hexobarbital sleeping time was increased in carbon tetrachlorid treated animals; after 2 weeks it was twice as long as controls; 2½ times after 4 weeks; 3 times after 8 weeks; and 10 times after 16 weeks. Carbon tetrachloride-treated animals gained weight more slowly than control animals and growth ceased after 2 months of treatment. Treated rats showed no liver changes until after 4 weeks when relative liver weight was 12% greater than controls; 29% after 8 weeks; 65% greater after 16 weeks. Treated rats displayed progressive morphological liver changes. Cirrhosis was apparent after 8 weeks and severe after 16 weeks. Retention of exogenous bilirubin increase after 8 weeks 76% greater than controls; and 94% greater after 16 weeks.

6457 EFFECT OF CARBON TETRACHLORIDE INDUCED PROGRESSIVE LIVER DAMAGE ON DRUG-METABOLIZING ENZYMES AND CYTOCHROME P-450 IN RAT LIVER.

(E.) Vorne, M. (U. Oulu Dept. Pharmacol. Finland) and P. Arvela. *Acta Pharmacol. Toxicol. (Kbh.)* 29(5-6):417-427, 1971.

The activities of drug metabolizing enzymes and glucose-6-phosphate dehydrogenase and cytochrome P-450 content of liver microsomes were determined in rats treated with carbon tetrachloride (2 ml/kg body weight, s.c. 3 times/week). Cytochrome P-450 content decreased progressively and became too low to measure after 16 weeks. Glucose-6-phosphate dehydrogenase activity remained 2-3 times normal throughout the 16 week treatment period. Demethylation of N-methylaniline decreased progressively to 25% of control activity after 16 weeks of treatment. Hydroxylation of hexobarbital decreased progressively until after 16 weeks it was too low to be measured. Conjugation of p-nitrophenol remained normal until 8 weeks of treatment when it decreased with developing liver cirrhosis until after 16 weeks 40% of conjugation activity was still recorded. Nitro reductase activity was normal for the first 8 weeks and had decreased to 36% of normal after 16 weeks.

6458 ESTRADIOL- AND TESTOSTERONE-INDUCED ALTERATIONS ON PHOSPHATIDYLCHOLINE AND TRIGLMYCERIDE SYNTHESIS IN HEPATIC ENDOPLASMIC RETICULUM. (E.) Young, D. L. (Duke U. Med. Ctr., Durham, N. C.). *J. Lipid Res.* 12(5): 590-595, 1971.

Biosynthesis pathways of phosphatidylcholine and triglycerides were investigated in hepatic endoplasmic reticulum from castrated and noncastrated male rats pretreated with estradiol or testosterone. Administration of estradiol to both castrate and noncastrate male rats had a significant effect on activity of enzymes governing biosynthesis of both phosphatidylcholine and triglyceride and testosterone-affected activity of diglyceride acyltransferase in castrate male rats. An increase in the specific activity of the enzyme governing phosphatidylcholine biosynthesis was shown by measurement in vitro of hepatic microsomal enzymes by the sequential methylation of phosphatidylethanolamine in the estradiol-treated castrate animals. A decrease of specific activity of phosphorylcholine-glyceride transferase was shown by estradiol treatment in castrate and noncastrate animals; and diglyceride acyltransferase activity was decreased by estradiol pretreatment in castrate and noncastrate animals and increased by testosterone in castrate animals. Increased in vivo incorporation of methyl groups of L-methionine into hepatic phosphatidylcholine in female and estradiol-treated rats may explain the changes in specific activity of the enzymes governing phosphatidylcholine biosynthesis. In female and estradiol-treated rats, a greater proportion of hepatic phosphatidylcholine is synthesized by stepwise methylation of phosphatidylethanolamine. The lipotropic-like effect of estradiol may be accounted for by the decrease in diglyceride acyltransferase activity after estradiol administration.

6459 LIPOPROTEIN SYNTHESIS AND FATTY ACID MOBILIZATION IN RATS AFTER PARTIAL HEPATECTOMY. (E.) Girard, A. (Res. Ctr. Nutr., Bellevue, France), P. S. Roheim and H. A. Eder. *Biochim. Biophys. Acta* 248(1):105-113, 1971.

The effects of partial hepatectomy on lipoprotein synthesis with increasing and decreasing triglyceride concentration and mobilization of free fatty acid from adipose tissue were studied in male Sprague-Dawley rats. The concentration and specific activity of very low density plasma lipoproteins was markedly increased at 6 and 24 hr after partial hepatectomy. All remaining plasma protein concentrations and specific activities were decreased or unchanged at 6 and 24 hr. No differences were found in the amount of fatty acid mobilized between the partially hepatectomized and sham-operated groups. There was also no detectable fatty acid mobilization from the fat pads of unoperated rats. In both operated groups, more radioactivity was in phospholipid than in triglyceride while more fatty acid was found in the liver triglycerides in the partially hepatectomized animals. Decreased formation of very low density lipoproteins are not seemingly responsible for the fatty liver observed after partial hepatectomy and the preferential incorporation of fatty acids into triglycerides rather than phospholipids may lead to triglyceride accumulation in the liver. Following partial hepatectomy, liver triglycerides increased rapidly to a maximum at 12 hr, remained high for 24 hr and returned to normal after one week. Cholesterol levels only increased slightly by 24 hr and total liver cholesterol content was lower in partially hepatectomized rats as compared to sham-operated controls. Total liver amino acid incorporation was decreased 6 hr after partial hepatectomy and was proportionate to the mass of the liver approaching control levels after 24 hr. Specific activity at this time was increased by two-fold in the partially hepatectomized animals. Total plasma protein concentration and specific activity of the plasma proteins was not affected by 6 hr but was decreased at 24 hr following partial hepatectomy. However, per gram of tissue, the smaller hepatectomized livers produced more plasma proteins than the controls.

6460 PLATELET AGGREGATION BY RAT LIVER. EVIDENCE FOR ADP AS MAJOR FACTOR. (E.) Ts'ao, C. (U. Chicago Pritzker Sch. Med., Ill.). *Am. J. Pathol.* 64(3):501-512, 1971.

Platelet aggregation inducing active material was investigated; physical and chemical properties of the active substance in rat liver infiltrate strongly supported the contention that the aggregation-inducing agent was ADP. Several lines of evidence led to the presumption that active tissue substance was ADP. The substance was probably derived from parenchymal cells, not RBC because highly vascularized tissues such as spleen, lung and endocrine organs failed to induce aggregation in platelet-rich plasma. The active material could be adsorbed on charcoal and dialyzed through cellophane. The molecule of the platelet-clumping factor was small since it could be filtered through a membrane that retained substances of molecular weight greater than 1000. The tissue factor was thermolabile in liver homogenates; thermostable in ultrafiltrates which indicated that degradative enzymes did not pass through the filter with active substance and activity of the ultrafiltrate was retained after prolonged frozen storage and resisted pronase digestion, strong acid and alkali, indicating that it was not a protein or peptide. Activity disappeared after incubation with apyrase. ADP was not detected directly in the ultrafiltrates by specific-enzyme assay but commercial quantities of undetectable levels of ADP (by light absorbancy) caused platelet aggregation.

6461 FORMATION OF GLUCOSAMINE 6-PHOSPHAGE IN REGENERATING RAT LIVER. (E.)

Akamatsu, N. (Chiba U. Sch. Med., Japan) and H. R. Maeda. *Biochim. Biophys. Acta* 244(2):311-317, 1971.

Experimental male Wistar rats were subjected to partial hepatectomy, while control rats were sham-operated. At various intervals after surgery, remaining liver tissue was removed, homogenized and assayed for the activity of glucosamine 6-phosphatase synthetase (L-glutamine:D-fructose 6-phosphatase aminotransferase, EC2.6.1.16). Enhancement of enzyme activity began soon after partial hepatectomy and continued for 72 hours, while in sham-operated rats only slight increases were observed. At 48 and 72 hr, levels in hepatectomized rats were twice those in controls, while by 6 days the levels were the same in both groups. *In vivo* administration of actinomycin D and cycloheximide inhibited the observed increases in enzyme activity. The partially purified enzyme was inhibited equally by boiled liver extracts from both groups. Feedback inhibition of enzyme activity by UDP-N-acetyl-D-glucosamine was the same in both groups.

6462 THE GLUCOSE EFFECT AND CORTISONE ACTION UPON RAT LIVER METABOLISM. (E.)

Hanoune, J. (Inst. Molec. Pathol., Paris), A.-M. Chembaut and A. Josipowicz. *Biochim. Biophys. Acta* 244(2):338-348, 1971.

The effect of an oral glucose load (1 g) on hepatic tyrosine transaminase levels was studied in fasted, normal male albino Wistar rats and in rats with streptozotocin-induced diabetes. After a single, oral dose of glucose in normal rats there was a very early, transient increase in enzyme activity, which was then strongly depressed for at least 16 hr. Similar inhibitory effects were seen with glycerol and fructose, but not with mannose and galactose, while ribose and galactosamine enhanced enzyme activity. The response to glucose was not seen in diabetic rats. Use of labeled precursors of RNA suggested that the mechanism of this "glucose effect" was probably an alteration in the enzyme protein synthesis rather than just an inhibition of its activity. Orally administered glucose effectively repressed the usual induction of hepatic tyrosine transaminase synthesis by i.p. cortisone at any time after the hormone administration. Despite the inhibitory effect of glucose on hepatic tyrosine transaminase and tryptophan oxygenase, there was no associated decrease in the basal level of labeled precursor incorporation into total liver RNA. Some of the effects of the glucose load were reversed by i.p. administration of glucagon, suggesting involvement of the hepatic adenyl cyclase system.

6463 STUDIES ON THE MECHANISM OF THE ETHYNYLESTRADIOL IMPAIRMENT OF BILE FLOW AND BILE SALT EXCRETION IN THE RAT. (E.)

Gumucio, J. J. (Catholic U. Chile, Santiago) and V. D. Valdivieso. *Gastroenterology* 61(3): 339-344, 1971.

Ethynylestradiol (0.5 mg daily for 5 days) given to Sprague-Dawley rats with biliary fistulas caused a 40% reduction in bile flow. The bile salt concentration in bile at each time interval (over an hour) was higher in the treated rats than in the controls. If the bile flow obtained during the first 5 min of bile collection is taken as 100%, the bile salt-independent fraction of bile water represents 40.4% of the total bile flow in the control rats and 26.6% in the treated rats. The clearance of ^{14}C-erythritol was significantly decreased in the ethynylestradiol-treated rats under basal conditions and during infusion of 22.5 mM and 45 mM sodium taurocholate. The bile salt independent fraction in the rat was canalicular bile water and the inhibitory effect of ethnylestradiol on bile flow was exerted on water secreted by the hepatocyte.

6464 FIXED DRUG COMBINATIONS AND THE DISPLACEMENT OF BILIRUBIN FROM ALBUMIN. (E.)

Schiff, D. (Montreal Child. Hosp., Quebec, Canada), G. Chan and L. Stern. *Pediatrics* 48(1):139-141, 1971.

The effect of caffeine and sodium benzoate, both alone and together (as a proprietary fixed combination of 64 mg/ml caffeine sodium benzoate) on albumin-bilirubin binding was studied. The albumin-bilirubin binding was assessed by Sephadex G-25 gel filtration, which gives a quantitative value for the amount of unbound bilirubin in a given albumin-bilirubin solution, and bilirubin spectral curves, which indicate any increase in free bilirubin (absorbance at 420 mm) and concomitant decrease in bound bilirubin (absorbance at 465 mm) resulting from the action of an uncoupling agent. In both methods, the effect of the fixed combination was 4 times that of sodium benzoate alone, while caffeine alone had no effect. The effect with injectable diazepam was 65% of that seen with its buffer preservatives (40% propylene glycol, 10% ethanol, 5% sodium benzoate and benzoic acid and 1.5% benzyl alcohol), while no effect was seen with diazepam powder.

6465 CANALICULAR BILE FORMATION IN THE ISOLATED PERFUSED RAT LIVER. (E.) Boyer, J. L. (Yale U. Sch. Med., New Haven, Conn.). *Am. J. Physiol.* 221(4):1156-1163, 1971.

The effects of 2,4-dinitrophenol (DNP), ouabain, and scillaren on bile flow, bile salt secretion, and bile secretory pressure were studied in vitro using isolated perfused rat livers. The source of the bile was predominantly from the hepatocyte during all phases of the study as shown by the biliary clearance of erythritol-^{14}C. Addition of DNP, ouabain or scillaren to the perfusate caused a decrease in bile production, bile secretory pressure, and bile flow accompanied by an increase in the concentration of bile salts. At least 50% of the spontaneous production of bile flow was independent of bile salt secretion as determined by regression analysis and correlation of canalicular flow and bile salt secretion. Thus, nonbile salt-dependent canalicular bile secretion may be involved in active sodium transport.

6466 pH EFFECTS ON O_2 CONSUMPTION AND ON LACTATE AND PYRUVATE PRODUCTION BY LIVER SLICES. (E.) Tobin, R. B. (Omaha VA Hosp., Neb.) and M. A. Mehlman. *Am. J. Physiol.* 221(4): 1151-1155, 1971.

The effect of pH on O_2 consumption and lactate and pyruvate content of rat liver slices, homogenates, and mitochondria was studied. When glucose was used as a substrate, the pH (over the range from 6 to 9) had a slight effect on the rate of respiration with a maximal rate at pH 8.5. With pyruvate as a substrate, the pH of the media had a significant influence on the rate of respiration of liver slices with a maximum at pH 7.4. At pH greater than 7 there was a progressive accumulation of both lactate and pyruvate in the media, with a large increase in the lactate/pyruvate ratio as the pH rose from 8 to 9 when glucose was used as a substrate. The pyruvate and lactate contents were maximal at pH 7.5 and 7.0, resp. Using pyruvate as a substrate, more pyruvate was utilized at higher pH; however, the lactate increased with increasing pH of the media over the entire pH range from 6 to 9. The lactate/pyruvate ratios in liver homogenates were close to theoretically predicted values. Results with the liver mitochondria were similar to those observed in liver slices.

6467 ON THE KINETICS OF LIVER ENZYME REGRESSION FOLLOWING INDUCTION. (E.) Haining, J. L. (VA Ctr., Jackson, Miss.). *Arch. Biochem. Biophys.* 144(1):204-208, 1971.

6468 STUDIES ON THE FUNCTION OF DEOXYRIBONUCLEASE INHIBITOR AFTER PARTIAL HEPATECTOMY. (E.) Hayasaki, N. (Toyama U. Dept. Clin. Biochem., Gofuku, Japan), K. Hosaka and K. Tsukada. *Biochim. Biophys. Acta* 238(1): 75-81, 1971.

6469 TRANSITORY CELL ANTIGENS OF RAT LIVER. I. THE SECRETION AND SYNTHESIS OF FETOSPECIFIC SERUM PROTEINS DURING HEPATIC DEVELOPMENT AND REGENERATION. (Fr.) De Nechaud, B. (Inst. Sci. Res., Cancer, Villejuif, France) and J. Uriel. *Int. J. Cancer* 8(1):71-80, 1971.

6470 ISOLATION AND CHARACTERIZATION OF C-4-METHYL INTERMEDIATES IN CHOLESTEROL BIOSYNTHESIS AFTER TREATMENT OF RAT LIVER IN VITRO WITH CHOLESTAN-3β,5α,6β-TRIOL. Scallen, T. J. (U. New Mexico Sch. Med., Albuquerque), A. K. Dhar and E. D. Loughran. *J. Biol. Chem.* 246(10): 3168-3174, 1971.

6471 REGENERATION OF THE LIVER AFTER PARTIAL HEPATECTOMY AS A FUNCTION OF AGE. (Ger.) Paulini, K. (U. Ulm 2nd Dept. Pathol., Germany), G. Beneke and R. Kulka. *J. Gerontol.* 4(3):141-153, 1971.

6472 TIME SEQUENCE OF LIVER PHOSPHOLIPID ALTERATIONS DURING DEPRIVATION OF DIETARY CHOLINE. (E.) Beare Rogers, J. L. (Food Drug Direct. Res. Labs. Tunney's Pasture, Ottawa, Ontario, Canada). *Can. J. Physiol. Pharmacol.* 49(3):171-177, 1971.

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6474 THIOL-DEPENDENT CHANGES IN THE PROPERTIES OF RAT LIVER SULPHOTRANSFERASES. (E.) Barford, D. J. (Univ. Coll., Cardiff, Wales) and J. G. Jones. *Biochem. J.* 123(3):427-434, 1971.

6475 STUDIES ON THE ENZYMATIC SYNTHESIS OF CHOLESTEROL: USE OF A LIVER ACETONE POWDER. (E.) Scallen, T. J. (U. Albuquerque Dept. Biochem., N. Mex.), M. W. Schuster, A. K. Dhar and H. B. Skrdlant. *Lipids* 6(3):162-165, 1971.

6476 HEPATOTOXICITY AND LIPID METABOLISM. IV. STRUCTURE AND MOLECULAR SPECIES OF HEPATIC TRIGLYCERIDE IN RATS TREATED WITH CARBON TETRACHLORIDE. (E.) Sugano, M. (Kyushu U. Sch. Agric., Fukuoka, Japan), K. Imaizumi,

S. Cho and M. Wada. *Lipids* 6(2):141-144, 1971.

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6489 GLUCONEOGENESIS IN RAT LIVER CYTOSOL. II. COMPUTER SIMULATION OF CONTROL PROPERTIES. (E.) Anderson, J. H. (U. Pennsylvania Dept. Biophys., Philadelphia), M. J. Achs and D. Garfinkel. *Comput. Biomed. Res.* 4(1-2):107-125, 1971.

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6492 THE INDUCTION OF MICROSOMAL HYDROXYLASES IN REGENERATING RAT LIVER. (E.) Spencer, T. (Queen's U. Dept. Biochem., Kingston, Ontario, Canada) and P. W. F. Fischer. *Chem. Biol. Interactions* 4(1):41-47, 1971.

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6495 COMPARATIVE METABOLISM OF CHLOROBENZYLATE, CHLOROPROPYLATE, AND BROMOPROPYLATE ACARICIDES BY RAT HEPATIC ENZYMES. (E.) Knowles, C. O. (U. Missouri Dept. Entomol., Columbia) and S. Ahmad. *Can. J. Physiol. Pharmacol.* 49(6): 590-597, 1971.

6496 BILE SECRETION AND MULTIPLICITY OF HEPATIC EXCRETORY MECHANISMS. (E.) Erlinger, S. (Beaujon Hosp., Clichy, France). *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):105-112, 1971.

6497 DNA-SYNTHESIS OF LYMPHOCYTES IN REGENERATING LIVER. (E.) Fichtelius, K. E. (U. Uppsala Inst. Human Anat., Sweden) and B. Kullgren. *Acta Pathol. Microbiol. Scand. [A]* 79(5):441-444, 1971.

6498 RELATIONSHIP BETWEEN URINARY EXCRETION OF KYNURENINE AND LIVER TRYPTOPHAN OXYGENASE ACTIVITY. (E.) Greengard, O. (New England Deaconess Hosp., Boston, Mass.). *Am. J. Clin. Nutr.* 24(6):709-711, 1971.

6499 EFFECTS ON NET PLASMA PROTEIN SYNTHESIS OF REMOVAL OF L-TRYPTOPHAN OR L-THREONINE FROM A COMPLETE AMINO ACID MIXTURE: STUDIES IN THE ISOLATED PERFUSED RAT LIVER. (E.) Miller, L. L. (U. Rochester Sch. Med. Dent., N. Y.) and E. E. Griffin. *Am. J. Clin. Nutr.* 24(6):718-729, 1971.

6500 THE STIMULATORY EFFECTS OF CARBON TETRACHLORIDE AND OTHER HALOGENOALKANES ON PEROXIDATIVE REACTIONS IN RAT LIVER FRACTIONS IN VITRO. GENERAL FEATURES OF THE SYSTEMS USED. (E.) Slater, T. F. (Univ. Coll. Hosp. Med. Sch., London) and B. C. Sawyer. *Biochem. J.* 123(5): 805-814, 1971.

6501 THE STIMULATORY EFFECTS OF CARBON TETRACHLORIDE ON PEROXIDATIVE REACTIONS IN RAT LIVER FRACTIONS IN VITRO. INTERACTION SITES IN THE ENDOPLASMIC RETICULUM. (E.) Slater, T. F. (Univ. Coll. Hosp. Med. Sch., London) and B. C. Sawyer. *Biochem. J.* 123(5):815-821, 1971.

6502 THE STIMULATORY EFFECTS OF CARBON TETRACHLORIDE ON PEROXIDATIVE REACTIONS IN RAT LIVER FRACTIONS IN VITRO. INHIBITORY EFFECTS OF FREE RADICAL SCAVENGERS AND OTHER AGENTS. (E.) Slater, T. F. (Univ. Coll. Hosp. Med. Sch., London) and B. C. Sawyer. *Biochem. J.* 123(5):823-828, 1971.

6503 INFLUENCE OF VITAMIN B_{12} AND GLUCOSE CYCLOACETOACETATE HYDROLYSATE ON OXIDATIVE PHOSPHORYLATION IN LIVER MITOCHONDRIA OF RATS FED AN ATHEROGENIC DIET. (E.) Reddi, T. G. (Univ. Dept. Biochem., Nagpur, India) and M. C. Nath. *J. Vitaminol. (Kyoto)* 17(2):101-104, 1971.

6504 THYMIDINE KINASE OF RAT LIVER. ACTIVATION BY PHOSPHOLIPASE C AND SUBCELLULAR DISTRIBUTION IN THE LIVER. (E.) Stirpe, F. (U. Bologna 2nd Dept. Microbiol., Italy) and M. La Placa. *Biochem. J.* 122(3):347-351, 1971.

6505 THE POSSIBLE ROLE OF MANGANESE IN HEPATIC LIPID TRANSPORT. (E.) Barak, A. J. (VA Hosp., Omaha, Nebr.), R. C. Keefer and D. J. Tuma. *Nutr. Rep. Int.* 3(4):243-246, 1971.

See also numbers: 6314, 6330

6506 A COMPARISON OF JEJUNAL RESPONSE TO CHOLERA EXOTOXIN AND TO HYPERTONIC MANNITOL. (E.) Halsted, C. H. (Johns Hopkins U. Sch. Med., Baltimore, Md.), L. S. Bright, E. H. Luebbers, T. M. Bayless and T. R. Hendrix. *Johns Hopkins Med. J.* 129(4):179-189, 1971.

Thiry-Vella jejunal loops in New Zealand rabbits were used to study the effects of cholera exotoxin and hypertonic mannitol, alone or together, on the volume and composition of luminal fluid. The volume response (μl/cm/3 hours) with exotoxin alone was 540, with mannitol alone, 632; and with exotoxin and mannitol, 1,047. Compared with controls, the intraluminal concentration of Na$^+$ increased with exotoxin and decreased with mannitol Bidirectional fluxes did not differ between the groups. While there was a significant increase in unidirectional flux of water into the lumen with either exotoxin or mannitol. In the exotoxin group, the movement of sodium into the loop paralleled the changes in movement of water, while in the mannitol group the movement of Na$^+$ into the lumen was less than in control loops even though movement of water into the lumen was comparable to that in controls. Inasmuch as the calculated Na$^+$-free water clearance was the same in loops exposed solely to mannitol as in loops exposed to exotoxin and mannitol in sequence, it was concluded that the response to cholera exotoxin did not involve increased mucosal permeability.

6507 GLYCOPROTEIN BIOSYNTHESIS IN SMALL INTESTINAL MUCOSA. I. A STUDY OF GLYCOSYLTRANSFERASES IN MICROSOMAL SUBFRACTIONS. (E.) Kim, Y. S. (VA Hosp., San Francisco, Calif.), J. Perdomo, and J. Nordberg. *J. Biol. Chem.* 246(17):5466-5476, 1971.

A complex transferase system involved in the transfer of N-acetylglucosamine, galactose, and N-acetylgalactosamine to various glucoprotein acceptors was found in mucosa from the rat small intestine. By separation of smooth- and rough-surfaced microsomes with a modification of Dallner's gradient-density centrifugation method it was demonstrated that these glycosyltransferases were found primarily in the smooth-surfaced microsomes, e.g. 95% of total microsomal polypeptidyl:N-acetylgalactosaminyltransferase activity was present in this fraction. After alkaline borohydride treatment and acid hydrolysis, N-acetylgalactosamine was incorporated into heat-treated rough-surfaced microsomal acceptors primarily at the protein-to-carbohydrate linkage while in the smooth-surfaced microsomal acceptors incorporation probably occurred at positions more distal in the polysaccharide moiety. A component which was immunologically identical with purified rat small intestine mucin was found by immunodiffusion only in the smooth-surfaced microsomes. These findings suggest that the completed protein core of secretory glycoprotein is released into vesicular channels of the rough-surfaced microsomes and is transported through channels to smooth-surfaced microsomes and to the Golgi apparatus. Carbohydrates are transferred to the protein core sequentially and immunological competence of this glycoprotein is attained at smooth-surfaced microsomes, the Golgi apparatus, or both. The completed mucin accumulates in the Golgi apparatus and is then secreted into the intestinal lumen.

6508 FURTHER STUDIES OF THE RESPONSE TO SECRETIN AND PANCREOZYMIN IN MAN. (E.) Wormsley, K. G. (Maryfield Hosp., Dundee, Scotland). *Scand. J. Gastroenterol.* 6(4):343-350, 1971.

Subjects with normal pancreatic function (healthy volunteers, patients undergoing minor surgery and patients with duodenal ulcers) were studied. All received i.v. infusions of secretin alone or of secretin with pancreozymin, with aspiration of duodenal contents. In 8 of 11 patients, significantly more bicarbonate was secreted in response to secretin (2 CU/kg-hour) than to a combination of secretin (0.25 CU) plus pancreozymin (4 IU/kg-hr). In all of 18 patients the bicarbonate response to secretin was significantly greater with 4 than with 2 CU. In 9 in whom pancreozymin (0.5 IU) was added to secretin (2 CU), the aspirate changed from acholic to bile-stained during the infusion of pancreozymin. In 4 of 5, the output of bicarbonate was significantly greater with the addition of pancreozymin (0.5 IU) to secretin (2 CU) than when the infusion of secretin was doubled (2 to 4 CU). The output of enzymes (trypsin, chymotrypsin, amylase) was significantly greater with secretin (0.25 CU) plus pancreozymin (4 IU) than with secretin alone. Compared with a test dose of secretin (0.25 CU), the enzyme response to 2 CU was greater in 3 of 6 and less in 2. In 5 of 6, the overall and post-pancreozymin enzyme response were less with addition of pancreozymin (0.5 IU) to 2 CU secretin than to 0.25 CU secretin. Bile pigment disappeared from the aspirate in 5 of 6 with infusion of 0.25 CU secretin and in 31 of 39 larger doses. The secretion of bile pigment in response to pancreozymin (0.5 IU) was both significantly delayed and lowered after prior infusion of secretin at 2 CU compared with 0.25 CU.

6509 EFFECT OF ACUTE RENAL FAILURE UPON CELL DIVISION ON THE JEJUNUM: RADIOAUTOGRAPHIC AND ULTRASTRUCTURAL STUDIES IN THE MOUSE. (E.) McDermott, F. T. (Monash U. Dept. Surg., Melbourne, Australia), J. Nayman and W. G. R. M. de Boer. *Ann. Surg.* 174(2):274-282, 1971.

Acute renal failure, induced in different groups of Swiss albino mice by i.p. injection of uranyl nitrate, a nephrotoxic agent, or by urinary obstruction, inhibited cell division in both groups and was more pronounced with severe renal failure. There was an inverse relationship between labeling index and blood urea level. Histological appearances were similar in all groups and there was no evidence of inflammation or ulceration. Blood urea levels in the uremic mice ranged between 410-455 mg/100 ml. Five cell types: undifferentiated cell, mucous cell, Paneth cell, enterochromaffin cell and crystal cell were identified in the jejunal crypt epithelium of each group examined. The latter 2 cell types were not frequently seen and Paneth cells were confined to the crypt bases. The inhibition demonstrated closely resembled that found in the proliferating connective tissue cells of wounds and in the esophageal epithelium in acute renal failure. Inhibition of cell renewal in acute renal failure may contribute to the development of uremic lesions in the digestive tract.

6510 INTESTINAL SECRETION: STIMULATION BY PEPTIDES. (E.)

Barbezat, G. O. (Wadsworth Hosp., Los Angeles, Calif.) and M. I. Grossman. *Science* 174(4007):422-424, 1971.

The effect of various peptides on small intestinal secretion was studied in dogs. Vasoactive intestinal peptide (VIP), gastric inhibitory peptide (GIP), glucagon and pentagastrin all stimulated secretion in both the jejunum and ileum. Neither secretion nor the COOH-terminal octapeptide of cholecytokinin evoked a secretory response. The electrolyte concentrations in the intestinal juice were characteristic of the level of intestine; thus, the secretory response to the peptides consisted of an increased volume flow rate with little change in electrolyte concentrations. The peptides may play a role in the regulation of intestinal function in the normal subject and/or in disease associated with excessive intestinal secretion.

6511 UPTAKE FROM BLOOD AND CONJUGATION OF BILIRUBIN BY THE INTESTINAL MUCOSA OF WISTAR, GUNN AND HEPATECTOMIZED RATS. (E.)

Rodriguez Garay, E. A. (Natl. U. Rosario Sch. Med. Sci., Argentina), M. del Rosario Spetale, L. S. Morisoli and H. R. Berra. *Experientia* 27(8):904-906, 1971.

When unconjugated bilirubin was infused in untreated rats with bile duct cannulas, a significant positive correlation was found between conjugated and unconjugated serum bilirubin and both forms of pigment in skin homogenates. No correlation was found between serum pigments and those present in intestinal mucosa. In the latter, variable amounts of azopigment B were seen in correspondence with the liver capacity for bilirubin excretion. A positive correlation was observed between conjugated bilirubin of intestinal mucosa and lumen contents. In hepatectomized rats azopigment B was not detected in serum samples but was always present in the intestinal mucosa. Mesenteric fat of hepatectomized rats contained only azopigment A, whereas that of 2 rats with bile duct ligation contained azopigment A and B. When radioactive unconjugated bilirubin was injected into hepatectomized rats, scanning of chromatograms of intestinal mucosa revealed a peak of radioactivity coincident with azopigment B and a secondary peak with azopigment A. After azopigment B spots were pooled, eluted and rechromatographed, 70% of azopigment A was now detected with most of the radioactivity present in this area. Serum unconjugated bilirubin can be taken up and then conjugated by the rat intestinal mucosa in vivo.

6512 PROXIMAL TO DISTAL VARIATIONS IN ENZYMES OF THE RAT INTESTINE. (E.)

Harrison, D. D. (Roy. Alexandra Hosp. Child., Sydney, Australia) and H. L. Webster. *Biochim. Biophys. Acta* 244(2):432-436, 1971.

Enzyme levels of in vitro preparations were assayed at all levels of the gut of male Wistar rats. Analysis was made of villous cell suspensions in EDTA-saline from each of 10 levels of the gut. The bulk of cellular protein was found in the first half of the gut. For invertase, the level of activity at the extreme proximal end increased 2-fold to reach a maximum in the mid-jejunum, and then fell off to a near-zero level in the distal gut. Levels of alkaline phosphatase were maximal at the most proximal portion of the gut and then fell off exponentially. Levels of leucine aminopeptidase were constant in the first half of the gut and then fell to about half of this level at the distal end. Esterase levels tended to be constant throughout the gut.

6513 EFFECT OF L-HISTIDINE ON HUMAN AND RAT JEJUNAL PYRUVATE KINASE ACTIVITY. (E.)

Stifel, F. B. (Fitzsimons Gen. Hosp., Denver, Colo.) and R. H. Herman. *Can. J. Biochem.* 49(10):1105-1116, 1971.

The nature and effect of L-histidine and other amino acids on jejunal and liver pyruvate kinase activity was studied in male Holtzman rats. L-histidine exerted a large stimulatory effect on jejunal and hepatic pyruvate activity in rat and in man in vitro. Serine, arginine and aspartic acid had a similar but less effect. Alanine and phenylalanine both inhibited jejunal pyruvate kinase in both rat and man while only alanine was shown to inhibit hepatic pyruvate kinase in rats. A dose response of pyruvate kinase to histidine was seen in both tissues and was blocked by the addition of either alanine, phenylalanine, or acetyl CoA. Liver and jejunum pyruvate kinase activity was significantly higher in rats fed a histidine-complete diet as opposed to rats fed on histidine-deficient meals. This increased activity was diminished within 4 hr in the jejunum and 12 hr in the liver after removing histidine from the diet, and reached a maximum for both tissues at 24 hr following initiation of the deficient diet. The percent stimulation of pyruvate kinase activity in vitro by L-histidine was inversely proportional to the basal activity in vivo. Histidine was shown to produce the greatest stimulation of hepatic and jejunal pyruvate kinase activity in rat and man in vitro as compared to the less stimulatory effects of various imidazole derivatives. At different incubation temperatures, pyruvate kinase·activity in the jejunum increased with increasing concentrations of histidine and was always greatest at lowest temperatures. The effect of histidine is seemingly ubiquitous in the rat since stimulation occurred in all rat tissues tested and, therefore, may play an important role in the regulation of glycolysis in mammalian systems.

6514 INFLUENCE OF DIET ON FLATUS VOLUME IN HUMAN SUBJECTS. (E.) Davies, P. J. (St. Vincent's Hosp., Melbourne, Australia). *Gut* 12(9):713-716, 1971.

The effects of 3 carefully chosen diets on volumes of flatus of 10 flatulent subjects using prolonged and repeated collections and the mechanisms involved in producing flatus is presented. The average flatus volumes on the 3 diets were: 10.9 ml/hr on diet A, a high carbohydrate, liquid chemically defined diet (Vivasorb); 26.7 ml/hr on diet B (restricted carbohydrate quantity and low crude fiber content); 49.4 ml/hr on diet C (high crude fiber content with 20% by weight of baked beans). According to the means for each subject, a highly significant increase in the volume of flatus for subjects taking diet C was observed as compared to the same subjects taking diet A or diet B. More prolonged studies with 4 subjects showed that there was an average 221% increase in flatus producing on changing from diet A to diet B. Only one subject showed a decrease in flatus while taking diet C. A dose correlation was also apparent between increasing the crude fiber content of the diet and enhanced production of flatus. These results indicate that gas from bacterial fermentation of undigested food residues, e.g. cellulose, passes into the colon and is not the result of the swallowing of air.

6515 GLUCAGON STIMULATION OF INTESTINAL SECRETION: DOES IT CAUSE WATERY DIARRHOEA? (E.) Rosenthal, W. S. (New York Med. Coll., N. Y.). *Lancet* 2(7722):497, 1971.

See also number: 6418

6516 HEPATIC BLOOD FLOW DURING LATE PREGNANCY. (E.) Laakso, L. (Univ. Cent. Hosp., Turku, Finland), P. Ruotsalainen, P. Punnonen and J. Maatela. *Acta Obstet. Gynecol. Scand.* 50(2): 175-178, 1971.

Colloidal heat-denatured serum albumin labeled with ^{131}I was used to measure hepatic blood flow in women in the 38-40th week of pregnancy (20 women) and in nonpregnant controls (15). Subjects consisted of 5 normal pregnant women and 15 with mild pre-eclampsia. The half-times of plasma activity were 2.0 min in controls and normal pregnant women and 3.0 min in pre-eclamptics, but this difference was not significant. The total blood volume was 68 ml/kg in controls, 50 ml/kg in normal pregnancy, and 69 ml/kg in toxemia, and values for the minimal hepatic blood flow were 26, 18, and 18 ml/kg, resp. Because of the extent of deviation, these differences were not significant. These findings suggest that pregnancy does not affect the function of Kupffer cells in the liver. This method of measuring blood blow is useful because it does not necessitate hepatic vein catheterization, but it is not suitable for analyzing group results because of the large individual variations; it may be useful for following individual patients.

6517 DIFFERENTIATION OF CUTANEOUS AND INTESTINAL BLOOD FLOW DURING HYPOTHALAMIC HEATING AND COOLING IN ANESTHETIZED DOGS. (E.) Schönung, W. (U. Giessen Physiol. Inst., Germany), H. Wagner, C. Jessen and E. Simon. *Pfluegers Arch.* 328(2):445-454, 1971.

Blood flow in arteries supplying cutaneous and intestinal vascular regions were simultaneously measured in anesthetized dogs, whose hypothalamic preoptic region was selectively heated and cooled with a sterotaxically-inserted, water-perfused thermode. Hypothalamic cooling increased intestinal blood flow while cutaneous blood flow was depressed to half the control value. Arterial pressure was not affected. An antagonistic response of cutaneous and intestinal blood flow, but of opposite direction, was also observed during hypothalamic heating. Heating increased intestinal vascular resistance, while cooling decreased this regional vascular resistance. Antagonistic changes of blood flow in the cutaneous and intestinal vascular beds represent typical thermoregulatory responses of systemic circulation induced by regionally antagonistic changes of vasomotor activity.

6518 A MATHEMATICAL MODEL OF THE HEPATIC PORTAL SYSTEM. (E.) Valentinuzzi, M. E. (Baylor Coll. Med., Houston, Tex.). *Med. Biol. Eng.* 9(3):213-220, 1971.

A mathematical model of the hepatic portal system in blood glucose homeostasis is presented. The model provides an integral view of the heaptic portal system and suggestions are made for further experiments. Two analytical techniques based on the continuity equation were used: (a) the flow diagram with its nodal equations which supplies information related to steady state flows, and (b) the compartmental method which characterizes the dynamics of the system. The basic assumption of the model was linearity. Several conclusions were made: (a) the hepatic portal system was reduced to a flow diagram to obtain a system of nodal equations; (b) nodal equations were used to find the hepatic production of glucose and hepatic blood flow; (c) nodal equations give information on steady-state flows; (d) differential equations of the system were used to calculate hepatic transfer function; and (e) information concerning the dynamics of the system and the transient response.

6519 LONG-TERM BLOOD FLOW STUDIES IN THE GASTRIC SUBMUCOSA OF UNANESTHETIZED RATS. (E.) Mackie, B. (U. Mississippi Med. Ctr., Jackson) and M. D. Turner. *Arch. Surg.* 103(4):500-504, 1971.

A hydrogen-gas tissue clearance method was developed to measure blood flow rates in the submucosa of the cardiac and the pyloric areas of the stomach in normal rats and 5 rats that developed abscesses in the abdominal wound or head cap. Following rapid i.v. injection of saturated potassium chloride (causing cardiac arrest), the rate of hydrogen gas clearance from the tissues immediately slowed and then abruptly ceased. In the early postoperative period, the mean pyloric perfusion rate was only slightly greater than that in the cardiac region, but blood flow rates obtained on the 14th postoperative day in the pyloric region were significantly greater than that in the cardiac region (0.79 ml/g/min vs. 0.47 ml/g/min). In infected rats, basal flow rates recorded on or after the 14th postoperative day were elevated. When rats were subjected to hypoxia, an immediate fall in blood flow occurred in the cardiac area (significant at 10 min), but it returned to normal after 90 minutes of continuous hypoxia. The mean increase in flow when rats were released from hypoxia was 41%, indicating a hyperemic response.

6520 LIVER PHYSIOLOGY AND PHYSIOPATHOLOGY. I. BLOOD FLOW. (Fr.) Benhamou, J. P. (Beaujon Hosp., Clichy, France), C. Sicot and S. Erlinger. *Presse Med.* 79(5):185-191, 1971.

6521 STATUS OF ABDOMINAL VISCERAL CIRCULATION VIA SUPERIOR MESENTERIC PROSTHESIS. (E.) Jaffe, M. S. (VA Hosp., Cincinatti, Ohio). *Am. J. Surg.* 121(6):736-738, 1971.

6522 DISTRIBUTION OF BLOOD FLOW TO THE MUSCLE AND MUCOSA OF THE RAT ESOPHAGUS. (E.) Zboralske, F. F. (Stanford U. Sch. Med., Calif.), G. S. Harell, G. L. DeNardo and B. Bradley. *Invest. Radiol.* 6(4):255-259, 1971.

See also numbers: 6303, 6377, 6402, 6404, 6416

6523 Tc^{99m} Na PERTECHNETATE SCANNING OF THE ABDOMEN WITH PARTICULAR REFERENCE TO SMALL BOWEL PATHOLOGY. (E.) Duszynski, D. O. (Child. Hosp., Buffalo, N. Y.), T. C. Jewett and J. E. Allen. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):258-262, 1971.

Abdominal scanning with ^{99m}Tc Na pertechnetate was performed on 50 patients with suspected abdominal pathology. Twenty-three patients showed normal abdominal patterns and 27 showed abnormal patterns at scanning due to various pathological lesions. Increased uptake of the isotope was seen in the gastric mucosa of Meckel's diverticula and in both acute and chronically obstructed small bowel loops. Initial scans of two patients showed decreased uptake in fluid-filled structures such as abscess and an anterior meningocele. Tc^{99m}Na pertechnetate abdominal scanning seemed to be of value in demonstrating some lesions which were not readily diagnosed by conventional contrast roentgenography.

6524 A MODIFICATION OF CHARCOAL ADSORPTION IMMUNOASSAY OF GASTRIC INTRINSIC FACTOR. (E.) Ghazi, H. A. (Roy. Infirm., Sheffield, England) and V. Annerson. *Gut* 12(8):661-662, 1971.

A modified immunoassay of gastric intrinsic factor is described in which the contribution to vitamin B_{12}-binding by the antibody serum is balanced by the same serum. In this 2-part procedure antibody serum is first added when it cannot interfere with binding of vitamin B_{12} to the gastric juice. Subsequently, antibody serum is added to the gastric juice before a vitamin B_{12} solution to prevent the uptake of vitamin B_{12} by the intrinsic factor in gastric juice. Several assays of intrinsic factor were done on gastric juice from a patient with pernicious anemia and a normal volunteer. Using 5 different randomly selected antibody sera, the standard error of the results using this modified technique was 0.670 mg/ml for normal gastric and 0.199 mg/ml for pernicious anemia gastric juice. This error is significantly lower than that obtained with other assay procedures. The consistency of the results obtained with this new assay system makes it unnecessary to use large fixed pools of serum and normal serum.

6525 GASTRIC PSEUDOLESIONS: ROENTGENOGRAPHIC-GASTROPHOTOGRAPHIC CORRELATION. (E.) Calenoff, L. (Northwestern U. McGaw Med. Ctr., Chicago, Ill.) and M. Sparberg. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):139-146, 1971.

Eighty-two cases in which a lesion of the stomach was suspected on the roentgen examination were examined gastroscopically and gastrophotographically and the results were analyzed for correlation between the procedures. Of the 14 cases in which positive roentgen findings were present with negative gastrophotographic findings (pseudolesions) 9 of the X-rays suggested a neoplasm, 4 an ulcer, and 1 a polyp. The roentgen appearance of the pseudo-lesion was, in most cases, attributed to a variation in the gastric mucosal fold pattern. Large, instead of small, folds in the fundus simulated a neoplastic lesion as did mucosal scarring. An ulcer was simulated by diagonal instead of longitudinal and prominent instead of indistinct folds on the lesser curvature, a cobblestone appearing mucosa of the greater curvature, or a slight depression of the mucosa in the pars media. Gastroscopy with photography seems to be a worthwhile adjunct in the diagnosis of a gastric lesion which yields equivocal results on X-ray examination.

6526 SERUM MUCOPROTEIN AND GUANASE LEVELS IN THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE. (E.) Steigmann, F. (Cook County Hosp., Chicago, Ill.), V. C. Gandhi, D. Silverman and A. Dubin. *Am. J. Gastroenterol.* 56(2): 109-117, 1971.

Serum mucoprotein and guanase levels were measured in 148 patients with biopsy-proven cases of acute viral hepatitis, 25 with chronic hepatitis, and 72 with neoplastic disease of the liver or biliary tract. A high percentage of patients with acute hepatitis demonstrated increased serum guanase activity while SGOT, SGPT and isocitric dehydrogenase levels were not markedly elevated indicating early (within the first 2 weeks) acute hepatitis. A few patients with malignant disease had an increased guanase activity. Approximately 30% of patients with jaundice associated with hepatic malignancy had elevated serum guanase activities. Patients with liver neoplasms demonstrated high serum mucoprotein values, whereas below normal values were observed in patients with acute hepatitis. These tests may be of additional diagnostic help in the evaluation of patients with jaundice.

6527 UNUSUAL TUMORS OF THE GASTROINTESTINAL TRACT. (E.) Berk, R. N. (U. California Sch. Med., La Jolla), G. S. Scher and D. F. Bode. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(1):159-170, 1971.

The radiologic manifestations of 5 unusual tumors of the gastrointestinal tract are described and a case history for each neoplasm is presented. Leiomyosarcoma of the esophagus can not be differentiated from squamous cell carcinoma of the esophagus by X-ray unless it is of the polypoid type. Leiomyoblastomas of the stomach are indistinguishable radiologically from other intramural gastric lesions. Neurofibroma of the stomach presents the usual radiologic features of benign mural lesions with a smooth, sharply circumscribed filling defect in the gastric lumen. The roentgen features of adenocarcinoma of the duodenal bulb are the same as those of carcinoma elsewhere in the gastrointestinal tract. The radiologic features of adenoacanthoma of the cecum are indistinguishable from the more conventional adenocarcinoma.

6528 PANCREAS IMAGING - IS IT WORTH IT? (E.)

Landman, S. (Argonne Cancer Res. Hosp., Chicago, Ill.) R. E. Polcyn and A. Gottschalk. *Radiology* 100(3):631-636, 1971.

One hundred and six radionuclide studies were analyzed for their clinical value in diagnosing normal and abnormal pancreas. In 88% of the cases with normal radionuclide studies no pancreatic lesions were found. Partial or nonvisualization of the pancreas was indicative of impairment of the gland, usually due to chronic pancreatitis or carcinoma. The nuclide image was unable to differentiate between these two pathological entities. Fewer false positive results were reported than previous studies due to gamma camera sequential imaging. Radionuclide studies using sequential imaging can be a valuable technique in evaluating pancreatic normality and abnormality.

6529 THE USE OF ALPHA BLOCKING AND BETA STIMULATING DRUGS IN COMBINATION TO IMPROVE OPACIFICATION OF THE PORTAL VENOUS SYSTEM.

(E.) Van Heertum, R. L., C. M. Cioffi and F. F. Ruzicka, Jr. (St. Vincent's Hosp., New York, N. Y.). *Radiology* 100(3):679-682, 1971.

Portal vein visualization for use in radiographic studies was enhanced by alpha blocking and beta stimulating agents in 9 dogs. Eleven studies were performed using phentolamine and isoproteranol and showed increased flow and faster clearance of contrast material than the controls. The optimum venous phase was seen an average of 2.5 sec earlier than the control. All 11 demonstrated markedly enhanced portal vein opacification and 10 showed an average of 1 mm increase of portal and superior mesenteric vein diameters as compared to controls. Studies measuring simultaneous central aortic and superior mesenteric artery pressures before and after drugs were administered demonstrated a greater drop in superior mesenteric arterial pressure than aortic pressure with low doses of isoproterenol, while with high doses of the drug the decrease in pressure in both vessels was equal. Dosages of 15 µg isoproterenol and 0.5 mg phentolamine provided adequate radiological results without lowering central aortic pressure or increasing heart rate. Studies using only isoproterenol gave similar results as those obtained with a combination of isoproterenol and phentolamine; however, less opacification was seen in the mesenteric-portal trunk. The combination of phentolamine with isoproterenol results in improved constant arterial portograms.

6530 COLONIC ELECTRICAL ACTIVITY RECORDING AND TOTAL FIBEROPTIC COLONOSCOPY. TWO NEW APPLICATIONS OF TRANSINTESTINAL INTUBATION.

(E.) Provenzale, L. (U. Catania Inst. Surg. Pathol., Italy) and A. Revignas. *Am. J. Gastroenterol.* 56(2):137-148, 1971.

Nonoperative endoscopic observation and visceral biopsy as well as electrical activity was studied in 246 patients with both diseased and normal colons using a "pulley system" for retrograde introduction of instruments into the colon. Fiberoptic colonoscopy made possible early diagnosis of carcinoma in 6 patients with negative symptoms and radiologic findings. Of 5 patients with possible malignancies, visceral biopsy enabled confirmatory diagnosis in 4 cases, and was successful in demonstrating additional lesions in patients with colonic polyps. Colonoscopy was either able to detect, confirm or correct various pathological states of the colon such as rectal bleeding, idiopathic proctocolitis, diverticular disease and ulcerative colitis. Electrical activity in normal colons consisted of low frequency "slow waves" with a mean amplitude of 140 microvolts (µV) and mean duration of 4 sec and "spike" potentials which lasted 0.2 sec and varied from 110 µV (ascending colon), 150 µV (descending colon) to 160 µV (sigmoid colon). Irregular rhythm slow waves were seen in the ascending colon while transverse and descending colon showed higher amplitude slow waves with frequent bursts of spikes. The sigmoid colon also had higher amplitude irregular slow waves, but showed very frequent spikes of all forms. Pathological states such as Hirschsprung's disease and idiopathic megacolon showed abnormal electrical activity of the colon. Nonoperative examination of the colon seems to be a valuable procedure; however, it is not proposed as routine and should be used after barium enema studies in only those patients without bowel stenosis or weakened intestinal walls such as in acute ulcerative colitis, vascular, or collagen diseases of the bowel.

6531 DESCRIPTION OF A CONTINUOUS IN VIVO PROCEDURE FOR STUDYING THE MAXIMUM LIVER CLEARANCE OF SULFOBROMOPHTHALEIN IN MAN.

(Fr.) Charbonnier, A. (CHU Chchin Biol. Res. Lab., Paris) and P. Nepveux. *C. R. Acad. Sci. [D] (Paris)* 273(3):402-405, 1971.

A technique is described in which BSP is infused i.v. at a rate of 15 mg/min in normal subjects or 6 mg/min in patients with biliary obstruction during the first hr; the rate of infusion is reduced to 1/3-1/4 of this value in the second hr, and is doubled during the third hr. Plasma BSP levels are recorded continuously on an Auto-Analyzer. This method makes it possible to obtain real variations which occur in plasma BSP during the test and to calculate precisely the slopes of 3 straight lines which are a function of the maximum hepatic clearance of BSP.

6532 CLINICAL LABORATORY EVALUATION OF THE AMERICAN OPTICAL BILIRUBINOMETER. (E.) Williams, R. A. (US Naval Hosp., San Diego, Calif.), L. L. Pitts, II, J. L. Weinerth and R. M. Dimmette. *J. Pediatr.* 79(4):671-674, 1971.

The Bilirubinometer and the modified Evelyn-Malloy diazo method for the measurement of bilirubin were compared and evaluated for accuracy with respect to standards, for day-to-day reproducibility, and for time required to return test results. Excellent correlation was observed between the two measuring techniques down to levels of 3 mg/100 ml or less at which point the deviations were relatively large in comparison with the quantity being measured. Under routine laboratory conditions, the Bilirubinometer was considerably more precise than the diazo method with less than 1% probability that the difference in precision was due to chance. The Bilirubinometer showed consistently better accuracy and reproducibility than the diazo method, but not at statistically significant levels. On the average, Bilirubinometer results were reported more quickly than diazo method results (47 vs. 106 min.). Neither test was altered by the presence of up to 25 mg methemoglobin/100 ml.

6533 ^{99m}Tc-HUMAN ALBUMIN MICROSPHERES (HAM) FOR MEASURING THE RATE OF GASTRIC EMPTYING. (E.) Calderon, M. (Baylor Coll. Med., Houston, Tex.), R. E. Sonnemaker, T. Hersh and J. A. Burdine. *Radiology* 101(2):371-374, 1971.

Gastric emptying rates were measured in 9 normal subjects, and in 7 duodenal ulcer, 7 gastric ulcer and 6 gastric carcinoma patients using radiopharmaceutical ^{99m}Tc-human albumin microspheres (HAM). Gastric emptying rates were expressed as the time necessary for 25, 50, and 75% of the initial radioactivity to leave the stomach. The mean rate in each patient group was significantly different, and no overlap occurred in the time required for 50% gastric emptying for one standard deviation. The configuration of the respective curves suggested characteristic patterns of emptying. Quantities of ^{99m}Tc-HAM may be used which are sufficient to provide excellent camera images of the stomach and intestines because of the low target organ and total body radiation dose. In patients with significant duodenal overlap, the lower stomach was excluded from monitoring, a circumstance which could affect count rates if an unequal distribution of radionuclide were present. Changes in radioactivity over the fundus and body may best reflect net transfer of gastric content when these areas are the most dependent portions of the stomach.

6534 A COMPARATIVE CLINICAL STUDY OF TWO CHOLECYSTOGRAPHIC AGENTS. (E.) Fischer, H. W. (Wayne County Gen. Hosp. Eloise, Mich.), F. E. Patterson and R. L. Pitman. *Invest. Radiol.* 6(4):249-254, 1971.

After an early evening meal, normal subjects (25) received 3 g p.o. of either iobenzamic acid (N-(3-amino-2,4,6-triiodobenzoyl)-N-phenyl-β-alanine, with an iodine content of 57.5%) or iopanoic acid (B(3-amino-2,4,6-triiodophenyl), with an iodine content of 61.4%). Radiography was performed after omission of breakfast the next morning. Urinalysis, hematologic and blood chemistry determinations were made before ingestion of contrast material and at 1-3, 7, 30 and 60 days after ingestion. At a later date the study was repeated with the subject receiving the other agent. Both agents were administered to 21, while 4 received only iopanoic acid. In the 21 receiving both, there was no significant difference between the 2 agents with respect to visualization of the gallbladder or the incidence of various side effects, including nausea (none), vomiting (none), diarrhea, abdominal pain, urgency and dysuria. Laboratory parameters of toxicity were not significantly different for the 2 agents.

6535 THE VALUE OF RADIOISOTOPE SCANNING IN THE INVESTIGATION OF SUSPECTED CARCINOMA OF THE PANCREAS. (E.) Heslip, P. G. (Dr. W. W. Cross Cancer Inst., Edmonton, Alberta, Canada) and T. R. Overton. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 112(4):667-677, 1971.

Dual radioisotope subtraction techniques for visualization of the pancreas were very useful in evaluating patients with obstructive jaundice or carcinoma of the pancreas without jaundice. Scans were obtained from 150 patients with final diagnosis available for 23 patients who presented with symptoms suggesting pancreatic malignancy. Cases presumed to have pancreatic malignancy but without pathological corroboration were omitted. Eight patients with obstructive jaundice showed generalized decreased and irregular radioisotope uptake and were subsequently proven to have carcinoma of the pancreas. The scan was normal in three patients who proved to have carcinoma of the biliary tract without involvement of the pancreas. Normal scans were found in serum hepatitis and silent choledocholithiasis; scans were abnormal in patients with carcinoma of the pancreas without jaundice. Chronic pancreatitis shows an abnormal pattern similar to carcinoma of the pancreas. Carcinoma, however, produces more distortion of pancreatic architecture and more irregular distribution of radioisotopes. Seven patients with extrapancreatic disease causing obstructive jaundice showed superior pancreas visualization. This was of considerable diagnostic importance since it ruled out pancreatic disease and indicated increased pancreatic uptake. Possibly depressed hepatic metabolism made more isotope available for pancreatic utilization or increased blood supply to the pancreas providing more radiosiotope to the pancreas. Only 7.5% of hepatic uptake of Se^{75} was excreted in bile, so that a reduced background activity in the small bowel was not present.

Altered pancreatic metabolism was not related to elevated bilirubin.

6536 LACTOSE-BARIUM SMALL BOWEL STUDY. EFFICACY AS A SCREENING METHOD. (E.) Thompson, J. R. (Loma Linda U. Dept. Radiol., Calif.) and I. Sanders. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):255-257, 1971.

One hundred unselected patients undergoing small bowel radiologic examination received 50 g of lactose mixed with a nonflocculating barium meal. Thirty-three patients (33%) had abnormal findings. Of these, 2 had rapid transit malabsorption and 6 had normal or delayed transit with lipodystrophy, cirrhosis (2 cases), partial small bowel section, nephrotic syndrome, and metastatic ovarian cyst adenocarcinoma. Eleven patients had a partial or complete obstructive pattern, 5 showed displaced small bowel loops, and 3 had Crohn's disease, none of whom showed appreciable small bowel dilatation, dilution of barium or intestinal hurry. Other diagnoses were Meckel's diverticulum, diverticulosis, right upper quadrant hernia and gastroenteritis. Thus, this method should be reserved for those patients showing clinical suspicion of lactase deficiency.

6537 ABDOMINAL COMPRESSION: A VALUABLE AID IN THE EXAMINATION OF THE ESOPHAGUS. (E.) Riddervold, H. O. (U. Virginia Sch. Med., Charlottesville), D. L. Seale and T. E. Keats. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2): 229-232, 1971.

The abdominal compression, used when the patient was in the right anterior oblique position in 15-35 degrees of Trendelenburg, slows the speed of the barium considerably and often gave an advantageous retrograde flow. With compression, dilatation of the normal esophagus fell in the range of 3.5-3, 5-4 cm. Measurements exceeding these figures indicated intraesophageal pressure of long standing, as seen in chronic lesions, such as achalasia. Four cases in which abdominal compression was useful in evaluating the condition of the patient's esophagus are presented.

6538 FINE-NEEDLE ASPIRATION BIOPSY OF THE LIVER. APPLICATIONS IN CLINICAL DIAGNOSIS AND INVESTIGATION. (E.) Lundquist, A. (U. Lund Dept. Intern. Med., Sweden). *Acta Med. Scand.* Suppl. 520:1-28, 1971.

In 2611 liver biopsies made with a 22 gauge needle (external diameter 0.7 mm), only 1 case of severe bleeding developed in a patient with an intrahepatic hematoma. A sufficient number of parenchymal cells were obtained for cytologic examination in 2580 biopsies (99%). Fine-needle biopsies provided less information than conventional Menghini needle biopsies, but a correct diagnosis was established in most of 20 patients with severe hepatitis and 20 patients with cirrhosis. Liver cancer was diagnosed correctly by this method in 57 of 74 patients; 15 false negative diagnoses were made. A specific diagnosis of primary hepatoma was made in 5 of 10 patients, a carcinoid tumor in 1 patient, and a metastasis from a malignant melanoma in 1 patient. The results of cytochemical determinations of iron in 59 patients with alcoholism and porphyria cutanea tarda and of triglycerides, phospholipids, and free and esterified cholesterol in patients with fatty liver, alcoholism, psoriasis, porphyria cutanea tarda, and diabetes agreed well with the results of chemical determinations. Fine-needle biopsies were used in conjunction with microchemical methods to follow changes in hepatic lipids in 3 normal volunteers after ingestion of 2.7-3 g/kg of ethanol. The molar ratio of triglycerides to phospholipids reached a maximum after 24 hr and normalized after 48 hr. Normal ranges for phosphorylase, amylo-1,6-glucosidase, glucose-6-phosphatase, α-glucosidase, β-glucosidase, N-acetyl-β-glucosaminidase, β-glucuronidase, acid phosphatase, and α-mannosidase activities were established in liver biopsies obtained from adult volunteers with the fine-needle technique. On the basis of liver enzyme deficiencies, type I glycogen storage disease was diagnosed in 1 child, type III in 1 child, type IV in 2 children, and Hurler's syndrome in 3 children.

6539 COMPARISON OF HISTOCHEMICAL AND BIOCHEMICAL IRON DETERMINATIONS IN HUMAN LIVER TISSUE. (Ger.) Hütteroth, T. (U. Marburg Med. Clin., Germany), G. Korb and G. Strohmeyer. *Klin. Wochenschr.* 49(19):1074-1077, 1971.

By means of the color reaction between iron and o-phenanthroline, determinations were made of the total iron, ferritin, and hemosiderin in the livers of 61 autopsied patients. These results were compared with the results of iron determinations made by staining with Prussian blue and Turnbull blue. With the Prussian blue reaction iron was found in the liver parenchyma of 23 of 61 patients and with the Turnbull reaction in only 12 of 61 patients. In the Kupffer cells iron was detected by the Prussian blue reaction in 18 of 61 patients and by the Turnbull blue reaction in 12 of 61 patients. A significant correlation was found between results obtained with the chemical method and those obtained by the histochemical methods. Results from the histochemical determination of total iron correlated best with the hemosiderin content of the liver tissue and, to a lesser extent, with the total iron content. A poorer correlation was found between the histochemically determined Kupffer cell iron content and the chemically determined liver iron content.

6540 RELIABILITY OF LIVER SCANNING WITH ^{198}Au. (E.) Nordman, E. (Univ. Cent. Hosp., Helsinki). *Strahlentherapie* 141(6): 677-681, 1971.

The reliability of isotope scanning method using ^{198}Au in the diagnosis of liver metastases was assessed in 336 patients with tumors by comparing it with the histologic findings, alkaline phosphatase, palpatory findings, and patients' survival time. Of 40 patients whose liver had been examined histologically in connection with laparotomy or autopsy, 82% of the 28 positive liver scannings were verifiable and were false positive in 5 (18%) cases. Palpation was positive in 64% and negative in 29% when scanning was positive. Half of the cases (6/12) of negative scanning for which a histologic diagnosis was made were false-negative. In this same group, according to histologic findings, alkaline phosphatase was positive in 90% of the metastatic livers, scanning in 79% and palpatory finding in 66%. False-positives were also numerous for both scanning and alkaline phosphatase tests. In the second group of 296 scannings without histologic verification, 129 showed positive liver scans and elevated alkaline phosphatase in 60%. Survival time was less than a year in 74%, and palpatory findings corroborated the scanning in 57%. Of 167 negative scannings, 58% showed normal alkaline phosphatases and 42% were elevated. Eighty-two percent of the latter group died within one year. Therefore, a positive liver scan seems to be a fairly reliable indication of liver metastases, especially when the alkaline phosphatase level is determined concurrently.

6541 USE OF UNABSORBED RADIOACTIVE MARKER SUBSTANCES IN A RE-ASSESSMENT OF THE RADIO-ACTIVE TRIOLEIN TEST OF FAT ABSORPTION. (E.) Ditchburn, R. K. (Gen. Infirm., Leeds, England), A. H. Smith and C. J. Hayter. *J. Clin. Pathol.* 24(6):506-514, 1971.

Of 83 patients in whom fecal collection was attempted and a radioactive marker was given, 40 received ^{51}Cr-chromium sesquioxide and 43 had ^{46}Sc-scandium chloride. The excretion rates of the 2 marker substances were identical. Collections giving recovery values of more than 90%, taken as complete collections, were seen in 48% of the patients. Of 33 patients who received both marker and ^{131}I-triolein, 15 were normal and 18 had gastrointestinal disorders. The upper limit of normal range was taken as 6.8 g/day, as determined by one chemical method (fat A), or 9.2 g/day as determined by another method (fat B) and 2.5% of administered dose for ^{131}I-triolein. In abnormal cases there was a good correlation between the triolein method and the fat A method and also between the triolein method and the fat B method. The ^{131}I-triolein excretion test was as accurate as the direct fecal fat measurement in distinguishing normal from abnormal and in discriminating degrees of abnormality. Previous criticism of the test may have been due to incomplete fecal collecting, causing false results.

6542 RADIOGRAPHIC DETECTION OF INTESTINAL OBSTRUCTION FROM A DISTENDED KASLOW TUBE. (E.) Carlson, D. H. (Hartford Hosp., Conn.) and W. P. Slover. *J. Can. Assoc. Radiol.* 22(1):30-32, 1971.

6543 SPONTANEOUS PRIMARY PERIRENAL HEMATOMA, OR WUNDERLICH COENEN DISEASE: A RARE CAUSE OF ACUTE ABDOMEN. (Rum.) Ionescu, A. (1st Hosp., Botosani, Rumania), I. C. Buhociu, V. Moisa and P. Radauceanu. *Rev. Med. Chir. Iasi* 75(1):237-240, 1971.

6544 PITFALLS IN THE DIAGNOSIS OF INTESTINAL OBSTRUCTION IN THE NEWBORN. (E.) Atwell, J. D. (Child. Hosp., Southampton, England). *Proc. R. Soc. Med.* 64(4):374-377, 1971.

6545 ANATOMIC VARIANTS DISCOVERED DURING CELIAC AND SUPERIOR MESENTERIC ARTERIOGRAPHY. (Fr.) Kamoun, A. (H. Thameur Hosp., Tunis, Tunisia), K. Tochev and G. Toubiana. *Tunis. Med.* 48(3):177-185, 1970.

6546 USE OF HIGH SENSITIVITY X-RAY FILM IN UPPER GASTROINTESTINAL TRACT EXAMINATIONS. (Jap.) Murakami, K. (Univ. Hosp., Kyushu, Japan). *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 30(2):116-119, 1970.

6547 ANGIOGRAPHIC DIAGNOSIS OF CONSTRICTIONS OF THE VISCERAL ARTERIAL TRUNKS. (Rus.) Shalkov, I. L., A. M. Levendiuk and G. A. Klimenko. *Vestn. Rentgenol. Radiol.* 46(2):55-59, 1971.

6548 X-RAY CONTRASTING OF THE PORTAL SYSTEM VEINS IN DIAGNOSIS OF DISEASES OF THE UPPER ABDOMINAL ORGANS. (Rus.) Akmalov, M. K. *Vestn. Khir.* 106(3):18-22, 1971.

6549 THE DIAGNOSTIC VALUE OF SELECTIVE TRANSFEMORAL ANGIOGRAPHY IN ACUTE GASTROINTESTINAL HEMORRHAGES OF OBSCURE ORIGIN. (Rus.) Shekhter, I. A., S. I. Babichev and N. T. Medvedeva. *Vestn. Khir.* 106(3):14-18, 1971.

6550 ELECTROSPLANCHNOGRAPHY (ESG). ITS APPLICATION TO DISEASES OF THE DIGESTIVE TRACT IN MAN. (Fr.) Martin, A. (Psychiatr. Hosp., Tours, France), J. Moline, J. Thouvenot and J. M. Masson. *Therapeutique* 47(2):145-146, 1971.

6551 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. EXPERIENCE WITH 106 EXAMINATIONS. (E.) Herba, M. J. (Montreal Gen. Hosp., Montreal, Canada) and J. Kiss. *J. Can. Assoc. Radiol.* 22(1):22-29, 1971.

6552 THE SIGNIFICANCE OF THE COMPARTMENT TRANSPORT RATE CONSTANTS OF ROSE BENGAL METABOLISM AND OF SCINTIGRAPHY IN FUNCTION TESTS OF THE HEPATOBILIARY SYSTEM. (Ger.) Varl, B. (U. Ljubljana Med. Clin., Yugoslavia) and M. Hribar. *Radiobiol. Radiother. (Berl.)* 12(1): 79-86, 1971.

6553 PERCUTANEOUS CHOLANGIOGRAPHY: A PRECISE ANSWER. (E.) Foster, R. P. (Baptist Hosp., Alexandria, La.), J. S. Rozier and B. P. Yonke. *J. La. State Med. Soc.* 123(1):5-8, 1971.

6554 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Venkataraman, M. S. (Govt. Gen. Hosp., Madras, India) and M. G. Varadarajan. *Mediscope* 13(11):553-560, 1971.

6555 COUNTERELECTROPHORESIS FOR DETECTION OF HEPATITIS-ASSOCIATED ANTIGEN: METHODOLOGY AND COMPARISON WITH GEL-DIFFUSION AND COMPLEMENT-FIXATION. (E.) Alter, H. J. (NIH, Bethesda, Md.), P. V. Holland and R. H. Purcell. *J. Lab. Clin. Med.* 77(6):1000-1010, 1971.

6556 RING PRECIPITATION TEST WITH THE URINE IN THE DIAGNOSIS OF VIRAL HEPATITIS. (Rus.) Kologorov, A. I. *Zh. Mikrobiol. Epidiol. Immunobiol.* 48(4):100-102, 1971.

6557 THE USEFULNESS OF SELECTIVE ANGIOGRAPHY OF THE CELIAC AXIS AND/OR THE SUPERIOR MESENTERIC ARTERY IN THE DIAGNOSIS OF HEPATIC, PANCREATIC AND SPLENIC DISEASES. (Fr.) Fontaine, R., J. L. Fontaine and J. Tonglo. *Rev. Bras. Cardiovasc.* 6(3):213-238, 1970.

6558 ISOENZYMES OF LACTIC DEHYDROGENASE IN THE DIAGNOSIS OF SECONDARY TUMORS OF THE LIVER. (Fr.) Plomteux, G. (Lab. Med. Chem., Liege, Belgium) and J. Toulet. *Rev. Med. Chir. Mal. Foie* 46(2):75-80, 1971.

6559 THE TECHNIQUE OF PERITONEOSCOPY. (E.) McBrien, M. P. (St. Peter's Hosp., Chertsey, England). *Br. J. Surg.* 58(6):433-436, 1971.

6560 RADIOACTIVE SELENOMETHIONINE LIVER SCAN IN THE DIAGNOSIS OF CARCINOMA OF THE LIVER. (Fr.) Caroli, J. (St. Antoine Hosp., Paris), G. Milhaud and J. E. De Saint Laurent. *Ann. Med. Interne (Paris)* 122(6-7):747-754, 1971.

6561 EVALUATION OF LIVER SCINTIGRAMS USING ^{99m}Tc SULFUR COLLOID FOR THE DIAGNOSIS OF LIVER DISEASES. (Jap.) Iwasaki, H., S. Shibata, Y. Mito and Y. Kasai. *Jap. J. Nucl. Med.* 8(1): 12-20, 1971.

6562 POSITION AND INCIDENCE ANGLE AS FUNDAMENTAL FACTORS INFLUENCING RADIOLOGICAL MORPHOLOGY OF THE STOMACH. (Sp.) Cros Campillo, T. (Francisco Franco City Sanitar., Madrid). *Hosp. Gen. (Madr.)* 11(1):27-56, 1971.

6563 THE DIFFERENTIAL DIAGNOSIS OF DISEASES OF THE ESOPHAGUS AND CARDIA. (Rus.) Loginov, A. S., L. K. Sokolov and V. S. Pomelov. *Khirurgiia (Mosk.)* 47(3):26-30, 1971.

6564 DOUBLE CONTRAST BARIUM ENEMA. TECHNIQUE. (Fr.) Hamelin, L. (U. Montreal Dept. Radiol., Canada) and M. Hurtubise. *Union Med. Can.* 100(8):1572-1580, 1971.

6565 ANGIOSCANNING IN THE DIAGNOSIS OF PANCREATIC DISEASES. (Rus.) Zubovskii, G. A., L. S. Rozenshtraukh and E. V. Krivenko. *Sov. Med.* 34(4):39-43, 1971.

6566 DUAL RADIOISOTOPE TECHNIQUES AND DIGITAL IMAGE SUBTRACTION METHODS IN PANCREAS VISUALIZATION. (E.) Overton, T. R. (Univ. Alberta, Edmonton, Canada), P. G. Heslip, P. A. Barrow and J. Jelinek. *J. Nucl. Med.* 12(7):493-498, 1971.

See also numbers: 6671, 6672, 6673, 6674, 6675, 6676, 6677, 6678, 6679, 6694, 6734, 6735, 6736, 6796, 6837, 6838, 6839, 6907, 6908, 6909, 6910, 6911, 6912, 6913, 6930, 6931, 6932, 6954, 6955, 6976, 6977, 6978, 6979, 6981, 6982, 6983, 6984, 6985, 7033, 7049, 7103, 7115, 7151

GASTROINTESTINAL DISEASES

ESOPHAGUS

6567 SEVERE PEPTIC ESOPHAGITIS IN A PATIENT WITH ZOLLINGER-ELLISON SYNDROME. (E.) Dodds, W. J. (Med. Coll. Wisconsin, Milwaukee), T. G. Dehn, W. J. Hogan, L. W. Worman and S. D. Wilson. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):237-240, 1971.

A 66-yr-old man with a duodenal ulcer was operated on for massive upper gastrointestinal bleeding. At operation a 50% gastric resection was performed as well as a Billroth II anastomosis and vagotomy. Postoperatively, the patient developed esophageal symptoms consisting of dysphagia and heartburn. Esophagograms showed severe esophageal narrowing extending to the level of the aortic arch as well as a large anastomotic ulcer associated with partial gastric outlet obstruction. Gastric pouch resection and gastrostomy did not reduce the dysphagia and epigastric pain. Additional clinical findings included blood urea nitrogen value of 29, a 16-cm esophageal stricture, extending from the gastric cardia to the aortic arch; and elevated serum gastrin all of which substantiated a diagnosis of Zollinger-Ellison syndrome. A total gastrectomy and 2/3 esophagectectomy were performed and the resected esophagus showed pronounced wall thickening, granulation tissue covering an ulcerated luminal surface, fibrosis and acute and chronic inflammation. The patient developed tubular necrosis and died following surgery. Autopsy showed a metastatic islet-cell tumor in the peripancreatic lymph nodes. Reflux of copious amounts of gastric juice into the esophagus as well as factors associated with gastric surgery seemed to account for the unusual but severe esophagitis seen in this patient.

6568 SAFETY AND EFFECTIVENESS OF THE MODIFIED SENGSTAKEN-BLAKEMORE TUBE: A PROSPECTIVE STUDY. (E.) Pitcher, J. L. (William Beaumont Gen. Hosp., El Paso, Tex.). *Gastroenterology* 61(3):291-298, 1971.

The safety and effectiveness of the Boyce-modified Sengstaken-Blakemore (SB) tube in the management of hemorrhage from esophageal varices was studied in 50 consecutive patients in US Army General Hospitals in whom a specific protocol for patient selection and care, and SB tube usage was followed. Primary control of variceal bleeding was accomplished with the first tamponade in 46 patients (92%), and in 5 of 8 (62.5%) who bled again after the first attempt at tube deflation but before tube removal; thus, in 7 patients (12%) attempts to control the bleeding by tamponade failed. No complications directly attributable to the modified SB tube were recorded in 42 patients (84%) and no major complications occurred in 48 (96%). The two major complications which occurred were aspiration of blood-gastric contents in one case, and esophageal mucosal laceration in the other. Thirty-two (64%) of the patients survived their bleeding episodes and left the hospital. There were 18 fatalities including 12 patients with severe liver failure. When used under the conditions of this study, the modified SB tube seems to be safe and effective for the emergency control of variceal bleeding.

6569 UPPER GASTROINTESTINAL BLEEDING AMONG NAVAJO INDIANS. (E.) Muggia, A. L. (U. New Mexico Sch. Med., Albuquerque). *Rocky Mt. Med. J.* 68(9):29-32, 1971.

The records of 50 patients (mostly in their twenties and thirties) admitted with upper gastrointestinal bleeding to the Gallup Indian Medical Center during a one-yr period were reviewed. Esophageal bleeding was found in 27 (54%) of these patients, while gastric bleeding was encountered in 22 (44%), the other patient having hemorrhage from a duodenal ulcer. Of the patients with gastric bleeding, 10 had ulcers, 8 had hemorrhagic gastritis, confirmed gastroscopically, and 4 had clinically diagnosed hemorrhagic gastritis. Esophageal varices were seen by esophagoscopy in 19 patients; 1 patient had an esophageal ulcer and 7 had esophagitis or Mallory-Weiss syndrome. Only 7 of the patients in this series gave no history of alcoholism. In these patients, endoscopy proved to be an important tool in the determination of the etiology of the upper gastrointestinal bleeding. Therapeutic trials with the Blakemore tube seem warranted when endoscopic equipment is not available in this population.

6570 SPONTANEOUS RUPTURE OF THE ESOPHAGUS: BOERHAAVE'S SYNDROME. (E.) Bolooki, H. (U. Miami Sch. Med., Fla.), I. Anderson, C. Garcia-Rivera and J. R. Jude. *Ann. Surg.* 174(2):319-324, 1971.

A method of management of postemetic esophageal rupture (Boerhaave's syndrome) based on experiences with 6 patients (all of whom survived) was reported. Important diagnostic characteristics were mediastinal emphysema and possible cervical s.c. emphysema. Diagnosis was confirmed by Gastrografin esophagograms taken in the lateral decubitus position. Boerhaave's syndrome must be differentiated from Mallory-Weiss syndrome since the former requires immediate surgical intervention while the latter may be treated conservatively. Careful postoperative fluid and volume replacement, meticulous repair of the mucosal and muscular layers of the esophagus and adequate drainage of the thoracic cavity and mediastinum were the main safeguards against undue morbidity and mortality in early and in delayed cases. With regard to fluid replacement, persistence of tachycardia and elevated temperature were guides to the amount of fluids administered.

6571 THE PATHOLOGY OF EXPERIMENTAL INJURY TO THE CAT ESOPHAGUS BY LIQUID CHLORINE BLEACH. (E.) Weeks, R. S. (Naval Hosp., San Diego, Calif.) and M. M. Ravitch. *Laryngoscope* 81(9):1532-1541, 1971.

The effect of liquid chlorine bleach placed in the esophagus of 37 cats for 3-10 minutes was determined by esophagoscopic observations made from 10 min to 30 days after the removal of the irritant. All animals showed evidence of damage to the mucosa and/or deeper layers. The pattern of injury seemed to progress from superficial mucosal ulceration with edema in the submucosa and muscular layer to necrosis with formation of granulation tissue and, finally, progression of fibroplasia and stricture formation. Granulation tissue was well advanced by the seventh day and by day 14 the formation of bundles of fibrous connective tissue was usually underway. The lesions were similar in appearance to those which are seen after the exposure of esophagi of dogs and cats to concentrated NaOH solutions. The mechanism of injury from the undiluted liquid chlorine bleach seems to be primarily oxidation of proteins.

6572 GASTROPULMONARY FISTULA AS AN UNUSUAL LATE COMPLICATION OF HIATAL HERNIA. (Ger.) Trojan, I. (Med. U., Ist Surg. Clin., Szeged, Hungary), J. Imre and F. Kulka. *Thoraxchir. Vask. Chir.* 19(2):152-154, 1971.

6573 NEONATAL DYSPHAGIA. 60 CASES. (Fr.) Grislain, J. R., R. Mainard and P. De Berranger. *Ouest Med.* 24(8):793-794, 1971.

6574 LEIOMYOMA OF THE ESOPHAGUS. (E.) Thomas, T. V. (U. Kansas Sch. Med., Kansas City). *Postgrad. Med.* 49(6):53-54, 1971.

6575 RADIOLOGIC CHANGES IN THE AREA OF THE CARDIA AFTER OPERATIONS FOR HIATUS HERNIA. (Rus.) Makarov, A. A. and I. S. Budilin. *Vestn. Rentgenol. Radiol.* 46(3):17-21, 1971.

6576 RADIOLOGIC EVALUATION OF THE FUNCTION OF A RETROSTERNAL ARTIFICIAL ESOPHAGUS CONSTRUCTED OF LARGE INTESTINE. (Rus.) Grigorian, G. O. and A. G. Vinnichenko. *Vestn. Rentgenol. Radiol.* 46(3):13-17, 1971.

6577 X-RAY IMAGE OF THE TERMINAL ESOPHAGUS AFTER SURGERY. (Ger.) Krc, C. (Palacky U. Med. Sch., Olmutz, Czechoslovakia), J. Doubravsky and J. Kralik. *Radiologe* 11(3): 89-103, 1971.

6578 HUGE HIATAL HERNIA. (Sp.) Monereo, J. (La Paz City Sanitar., Madrid), J. Alba Losada and A. Vilarino. *Bol. Soc. Vasco-Navarra Pediatr.* 5(18):187-191, 1970.

6579 INTRATHORACIC GASTRIC VOLVULUS IN HIATAL HERNIAS. 6 CASES. (Fr.) Viard, H. (Bocage Hosp., France), C. Klepping and J. Bouhey. *Lyon Chir.* 67(1):30-34, 1971.

6580 PULMONARY COMPLICATIONS OF ESOPHAGEAL ABNORMALITIES. (E.) Cohen, S. (Pollak Hosp. Chest Dis., Jersey City, N. J.) and A. D. Recano, Jr. *J. Med. Soc. NJ* 68(6):503-508, 1971.

6581 CARCINOMA OF THE ESOPHAGUS. DIAGNOSIS AND TREATMENT. (E.) Ansari, A. (VA Hosp., Minneapolis, Minn.). *Geriatrics* 26(5): 98-104, 1971.

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6583 TRAUMATIC SLIPPED HIATUS HERNIA. (Ger.) Konrad, R. M. (Univ. Surg. Clin., Dusseldorf, Germany), H. Hohmann and S. Tarbiat. *Munch. Med. Wochenschr.* 113(9):302-309, 1971.

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6595 CARDIAC AND RESPIRATORY MANIFESTATIONS OF DIGESTIVE TRACT DISORDERS. (Fr.) Renault, M. G. *J. Med. Chir. Prat.* 142(12): 445-452, 1971.

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6599 THE PROBLEMS OF HEMORRHAGES FROM ESOPHAGEAL VARICES. (Ger.) Swe, W. (Humboldt U. Dept. Hepatol., Berlin), K. Wagner and G. Schneider. *Dtsch. Gesundheitsw.* 26(13): 583-586, 1971.

6600 DIAPHRAGMATIC HERNIA AND DIAPHRAGMATIC EVENTRATION IN INFANCY. (Ger.) Oberniedermayr, A. (U. Munich, Pediatr. Clin., Germany). *Chir. Praxis* 15(1):95-98, 1971.

6601 RADIOLOGIC FEATURES OF THE ESOPHAGUS. II. (Fr.) Bernaille, C. and J. C. Reysseguier. *Feuillets Electroradiol.* 11(61): 27-48, 1971.

6602 THE IMPORTANCE OF pH MEASUREMENT OF THE ESOPHAGUS IN THE DIAGNOSIS OF GASTROESOPHAGEAL REFLUX. (Rus.) Ezerietis, E. T., V. V. Utkin, S. A. Berzin and I. I. Leia. *Khirurgiia (Mosk.)* 47(3):23-26, 1971.

6603 DIAGNOSTIC DILEMMAS. II. MEGAOESOPHAGUS IN AN OCTOGENARIAN. (E.) Clark, A. N. G. *Mod. Geriatr.* 1(2):161-163, 1971.

6604 VALUE OF X-RAY EXAMINATION OF THE ESOPHAGUS IN OUTPATIENT PRACTICE. TECHNIQUE AND EVALUATION OF ESOPHAGEAL RADIOLOGY. (Ger.) Bopp, J. (Local Gen. Hosp., Bielefeld, Germany). *Med. Welt* 22(21):869-873, 1971.

6605 RADIOLOGIC STUDY OF ESOPHAGEAL DYSKINESIAS. (Fr.) Bourjat, P. *France Med.* 34(2):9-15, 1971.

See also numbers: 6537, 6563

6606 DETERMINATION OF THE LOSS OF PLASMA ALBUMIN IN THE HUMAN STOMACH WITH ^{51}Cr-LABELED SERUM ALBUMIN. NORMAL AND PATHOLOGICAL VALUES; RELATION TO GASTRIC "ALKALINE SECRETION". (Fr.) Vidon, N. (St. Lazare Hosp., Paris) and J. J. Bernier. *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):153-168, 1971.

Measurements of plasma albumin in histamine-stimulated gastric secretion 24 hr after i.v. injection of ^{51}Cr-labeled serum albumin revealed that 3 patients with giant hypertrophic gastritis secreted significantly more albumin than 3 normal subjects and patients with duodenal ulcer (4), chronic pancreatitis (3), or subatrophic gastritis (1). The total protein concentration of gastric juice determined by the biuret method was significantly higher than the serum albumin concentration, but there was a correlation between total protein and serum albumin concentrations. Significant differences were found between total protein concentrations in normal subjects and patients with duodenal ulcers and chronic pancreatitis; total protein secretion was still greater in patients with giant hypertrophic gastritis. It is concluded that higher results obtained with the biuret method are due to the presence of other proteins, particularly pepsin, in the gastric juice. In a larger group of normal subjects and patients with gastrointestinal disease it was demonstrated that the hourly output of acid is positively correlated with the hourly output of protein. On the basis of these findings and literature data it is postulated that some of the proteins in gastric juice transudate directly from the plasma or from a compartment which exchanges rapidly with the plasma. These proteins decrease the acidity of the gastric juice and account for a relatively large percentage of alkaline secretion in the stomach.

6607 GASTROSCOPY AND CYTOLOGY IN THE DIAGNOSIS OF GASTRIC MALIGNANT DISEASES. (E.) Myren, J. (Ulleval Hosp., Oslo, Norway), S. Reichborn-Kjennerud. *Scand. J. Gastroenterol.* 6(5):385-388, 1971.

The accuracy of diagnosis in unselected patients examined by routine gastroscopy and cytology of gastric washings was compared with diagnoses made from histological specimens obtained from autopsy or surgery. Gastroscopy and cytology established a correct diagnosis in about 90% of the cases of histologically verified malignancies (33 cases). Gastroscopy alone gave a correct diagnosis in 80% and cytology in 70%. Cytology demonstrated malignant cells in 5 cases with early carcinoma. Gastroscopy alone suggested a false malignant ulcer in about 20% of 49 cases of histologically verified benign lesions. Cytological preparations of the gastric washings gave a false diagnosis of malignancy in 2 cases of benign gastric ulcer. Carcinoma in situ was correctly diagnosed by gastroscopy and cytology. Roentgen examination usually fails to detect malignancy at this stage.

6608 CARCINOGENIC ACTION OF 2,7,DIACETYLAMINOFLUORENE ON THE STOMACH OF RATS WITH EXPERIMENTAL GASTRIC ULCER. (E.) Kowalewski, K. (U. Alberta Surg.-Med. Res. Inst., Edmonton, Canada) and E. F. Todd. *Scand. J. Gastroenterol.* 6(4):323-328, 1971.

In experimental male Buffalo rats penetrating gastric ulceration (6 mm in diameter) was produced after gastrotomy in the midportion of the posterior wall of the stomach, proximal to the pylorus, by electrothermocautery. The rats and uninjured controls were then fed a diet containing 2,7-diacetylaminofluorene at 30-44 weeks after injury. Precancerous lesions were found in 5.6% of carcinogen-fed noninjured and in 40% of carcinogen-fed injured rats. Gastric adenocarcinoma was found in 14% of carcinogen-fed injured rats but in none of those who were subjected to only one or neither of these procedures. Periportal cirrhosis was found in all rats fed the carcinogen, irrespective of injury, while hepatic tumors were found in 15.1% of noninjured and 25.5% of injured rats fed the carcinogen.

6609 GASTROINTESTINAL FINDINGS IN AUTOIMMUNE THYROIDITIS AND NON-GOITROUS JUVENILE HYPOTHYROIDISM IN CHILDREN. (E.) Kuitunen, P. (U. Helsinki Child. Hosp.), J. Mäenpää, K. Krohn and J. K. Visakorpi. *Scand. J. Gastroenterol.* 6(4):335-341, 1971.

Subjects consisted of 21 patients (12 euthyroid, 9 hypothyroid) with autoimmune thyroiditis and 10 with nongoitrous juvenile hypothyroidism. Associated diseases in these patients included atrophic disease (5), agamma-A-globulinemia (4), diabetes mellitus (4) and collagen vascular diseases (3). The gastric mucosa was abnormal in 12 of the 31, only 2 of whom showed gastric atrophy. All 5 with betazole fast achlorhydria had abnormal gastric mucosa. There was no relationship between the state of the gastric mucosa and the duration of thyroid disease. Antibodies to parietal cells were detected in 8 patients and there was a correlation with mucosal changes. None of the patients had antibodies to intrinsic factor, smooth muscle or mitochondria, but antinuclear antibodies were found in 1 patient with autoimmune thyroiditism, subtotal villous atrophy, rheumatoid arthritis and autoimmune nephropathy. Abnormal intestinal mucosa was detected in 6 of 30 patients, 2 of whom had subtotal villous atrophy and one, partial villous atrophy. Both patients with subtotal atrophy had an abnormal D-xylose test and steatorrhea, while the one with partial atrophy had slight steatorrhea. Antibodies to cow's milk occurred in 4 patients, but did not correlate with mucosal changes. Antibodies to gluten were found only in 1 patient with subtotal atrophy. The 3 with villous atrophy showed some improvement on a gluten-free diet. In general, the serum levels of IgG were above the mean of normals while those of IgA were below the mean.

6610 GASTRIC EMPTYING IN ATROPHIC GASTRITIS AND CARCINOMA OF THE STOMACH. (E.) Davies, W. T., J. R. Kirkpatrick, G. M. Owen and R. Shields (U. Liverpool Dept. Surg., England). *Scand. J. Gastroenterol.* 6(4):297-301, 1971.

Delay in gastric emptying was found in atrophic gastritis and marked gastric stasis in carcinoma of the stomach. Gastric emptying was estimated by measuring the disappearance from the stomach of a standard meal containing radioactive chromium in 16 patients with atrophic gastritis, 10 patients with gastric cancer and 11 patients without gastroduodenal disease. However, no correlation between emptying and secretion of acid on pentagastric stimulation was evident in either atrophic gastritis or cancer of the stomach. Emptying delay in gastric carcinoma and atrophic gastritis suggested a relationship may exist between these two conditions. Metaplasia of gastric mucosa to an intestinal type of epithelium, a prominent feature of atrophic gastritis and gastric atrophy, may represent precancerous change. The role of atrophic gastritis may be associated with delay in gastric emptying. Patients with duodenal ulcer are not likely to develop gastric cancer as they have a rapid stomach emptying rate.

6611 AGE-DEPENDENT BONE LOSS AFTER GASTRECTOMY. (E.) Fujita, T. (U. Tokyo Fac. Med.), Y. Okuyama, N. Handa, H. Orimo, M. Ohata, M. Yoshikawa, H. Akiyama and T. Kogure. *J. Am. Geriatr. Soc.* 19(10):840-846, 1971.

The effect of gastrectomy (53 patients) on bone and calcium metabolism was studied through measurement of clavicular cortical thickness in postero-anterior chest X-ray films. For gastrectomized patients the values of clavicular cortical thickness were almost invariably lower than for controls or untreated peptic ulcer patients of corresponding age. This decline in bone thickness became more pronounced as years elapsed following gastrectomy. A decline of cortical thickness by more than 20% was seen in 11 of 25 patients (44%) operated upon by the Billroth I method (end-to-end gastroduodenostomy) and in 15 of 20 patients (75%) operated upon by Billroth II method (side-to-side gastrojejunostomy). Orally ingested ^{45}Ca appeared in the blood and urine at least as fast as in the gastrectomized subjects. Slightly more ^{45}Ca appeared in the 72-hr stools of the gastrectomized subjects compared with controls, suggesting an impairment of overall calcium absorption, despite the initially favorable passage of calcium into blood. The facilitation of age-dependent changes in calcium metabolism by gastrectomy requires the careful attention of geriatricians in view of the possible profound influence on various geriatric diseases including osteoporosis.

6612 GASTROSCOPIC ELECTROSURGERY. (E.) Blackwood, W. D. (VA Hosp., Minneapolis, Minn.) and S. E. Silvis. *Gastroenterology* 61(3):305-314, 1971.

The use of the Olympus GFB fibergastroscope in gastroscopic electrosurgery is assessed in 16 dogs. The size of lesions produced was directly proportional to the amount of energy applied by the Bovie Electrosurgical unit to the mucosal wall. All lesions produced at energy levels less than 50 Bovie units (optimal) healed while those at 75 and 100 did not. Lesions were produced at Bovie settings of 25 and 50 and ranged from 2 to 20 mm at the time of coagulation. Animals were killed and autopsied and found that of the 20 lesions produced the correlation coefficient between the estimated and observed lesion size was 0.87. Necrosis of the muscularis propria varied directly with the diameter of the lesion produced. Below 2.5 mm diameter no muscle necrosis was observed but necrosis increased to 80% in the diameter range of 10 to 20 mm. No free perforation of the gastric wall nor damage to the fibergastroscope was observed. Transgastroscopic electrosurgery seems to be feasible in dogs and may become therapeutically important in the control of postbiopsy bleeding as well as intragastric bleeding due to ulcers.

6613 PALMAR VARICES AND GASTROINTESTINAL BLEEDING. (E.) Sherwood, W. C. (Philadelphia Gen. Hosp., Pa.). *Arch. Intern. Med.* 128(4):598-599, 1971.

A patient with repeated gastrointestinal bleeding from isolated gastric varices, without evidence of portal or splenic vein hypertension, and who demonstrated striking variceal changes of the veins of the hands is presented. The skin of the palms was thin and parchment-like, with loss of the normal dermatoglyphic pattern; however, the antecubital venous pressure was normal bilaterally. An arteriogram of the left hand revealed multiple saccular deformations of the veins of the fingers and palms with no evidence of arteriovenous communications. Results of an X-ray series of the upper gastrointestinal tract was normal; however, at operation a large bleeding varix of the antrum was found and partial gastrectomy was performed. Further excision was required when the bleeding recurred. This case contributes supportive evidence to the postulation that gastric varices may occur unrelated to venous obstructive factors.

6614 INHERITANCE OF HYPERTROPHIC PYLORIC STENOSIS. (E.) Bilodeau, R. G. (Indiana U. Med. Ctr., Indianapolis). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):241-244, 1971.

The case history of a white family in which the mother, son and identical twin daughters had a history of hypertrophic pyloric stenosis is reported. Roentgenographic studies of the upper gastrointestinal tracts demonstrated the pyloric stenosis in each case, and additional classical diagnostic roentgen signs for hypertrophic pyloric stenosis were enumerated. The theory that hypertrophic pyloric stenosis is inherited as a dominant polygenic trait, and that the threshold level for expression of this disease state is lower for men than women is supported by recent genetic studies. However, this case report supports the hypothesis that females with hypertrophic pyloric stenosis carry more genes for the condition and, therefore, have a greater risk of producing affected children than comparable males.

6615 MECHANISM OF POSTGASTRECTOMY HYPOGLYCEMIA. (E.) Shultz, K. T., F. A. Neelon, L. B. Nilsen and H. E. Lebovitz. (Duke U. Med. Ctr., Durham, N. C.). *Arch. Intern. Med.* 128(2):240-246, 1971.

Nine patients with symptomatic postprandial hypoglycemia after subtotal gastrectomy were studied. For the first 120 min after a p.o. load of 100 g glucose, the serum glucose levels of these patients were significantly higher than those of controls, while by 180 min their levels had fallen to hypoglycemic values, in contrast to the normoglycemic controls. Plasma insulin levels in patients were consistently elevated above controls, returning to fasting levels only at 180 min. After an i.v. dose of glucose, the patients had a glucose disposal constant (the % fall in plasma glucose/min) significantly less than normals; in 4 the values were in the diabetic range while in 4 they were normal. The insulin response was significantly lower in patients than in controls. After i.v. tolbutamide there was low normal insulin secretion and a somewhat blunted glucose response. Secretin (i.v.) had no significant effect on blood glucose but did cause a transient rise in plasma insulin levels, as also observed in normals. After i.v. pancreatic glucagon, the patients did not differ from previously reported normals with respect to the rises in glucose and insulin. In 2 patients, no detectable changes in glucose or insulin were noted over the 5 hours after the p.o. administration of hypertonic magnesium solution. In 4 patients with a normal glucose disposal constant, i.v. administration of glucagon 25 minutes after i.v. glucose led to an exaggerated secretion of insulin and delay in hypoglycemia. Two carbohydrate-restricted patients (50 g carbohydrate, 2,500 calorie diet in 6 equal daily feedings for several months) gained weight and had a striking amelioration of their hypoglycemic symptoms and showed no change in the early plasma glucose curves, absent later hypoglycemia and a marked decrease in insulin secretion.

6616 INTERACTION BETWEEN ABO AND RHESUS BLOOD GROUPS, THE SITE OF ORIGIN OF GASTRIC CANCERS, AND THE AGE AND SEX OF THE PATIENT. (E.) Glober, G. A. (Radcliffe Infirm., Oxford, England), E. G. Cantrell, R. Doll and R. Peto. *Gut* 12(7):570-573, 1971.

The interrelationship between the blood group, sex and age of the subject and the occurrence of cancer in different parts of the stomach were studied in 1,680 patients treated for gastric cancer in four London hospitals. Male predominan was more marked at ages 40-69 yr than at other ages. The male predominance was significantly greater for cancers at the proximal and middle thirds (2.48:1 and 2.43:1, resp.) than for those arising in the distal third of the stomach (1.46:1). The frequency for blood group A was greater and that of group O was less in gastric cancer patients than in controls. No significant association was found between blood group and the sex or the age of the gastric cancer patients. No significant predilection appeared for any one gastric site to be associated with group A compared with others. The frequency with which the Rhesus factor was found in the cancer cases did not differ significantly from that in the contro and was not related to the tumor site or the sex or age of the patient.

6617 KININ RELEASE AFTER GASTRIC SURGERY. (E.) Cuschieri, A. (U. Liverpool, England) and O. A. Onabanjo. *Br. Med. J.* 3(5774):565-566, 1971.

Plasma kinin generation was measured by a bioass technique using rat uterus in six postoperative patients with vasomotor dumping and in six patie without dumping who had previously had similar gastric surgery. All six dumping patients showe a fall in the venous kininogen during an attack (mean 1.02 μg/ml). When the attack subsided the venous kininogen rose to about the initial value In the gastric controls the fasting venous kininogen was similar to that in the dumping group and showed no significant change after a high carbohydrate meal. In four of six patients who developed a dumping attack a raised plasma kinin activity was detected at the height of the vasomotor symptoms. This free kinin-like activity was inactivated by incubation with chymotrypsin (250 μg/ml). Free plasma kinins were not detected in the gastric control group either before or after a high carbohydrate meal

6618 GLYCOPEPTIDES FROM NORMAL AND ULCERED GASTRIC MUCOSAE OF PIG. (E.)

Pallavicini, G. (Univ. Inst. Biol. Chem., Pavia, Italy), G. Cetta, A. Quaroni, and A. A. Castellani. *Experientia* 27(8):895-897, 1971.

By chromatography on Dowex 2 glycopeptide fractions were obtained from each of 5 papain extracts of swine gastric mucosa; 2 pigs had stomach ulcers induced by phenylbutazone (100 mg/kg p.o. and 100 mg/kg p.o. + 100 mg/kg i.p., resp.), 1 had a spontaneous ulcer, and 2 were untreated controls. Two glycopeptide fractions were obtained from each extract. The F1 fraction, eluted by water, contained similar amounts of galactose, fucose, and hexosamine in the carbohydrate moiety. The ratios of threonine + serine/total protein and aspartic + glutamic acids/total protein did not differ appreciably in the protein moiety of glycopeptides in F1 fractions from pigs with normal and ulcerated mucosae. The F2 fraction eluted by 0.5 M NaCl, was characterized by the presence of sulfate ions and sialic acid in addition to hexosamines, hexoses, and fucose; this makes it similar to glycopeptides from dog gastric mucosa and submaxillary glands. The sulfate ion content in the F2 fraction from pigs with ulcers was 50% less than in control pigs. This supports the hypothesis that sulfate ions in gastric mucus are important in protecting the mucosa; they cover and protect the mucosa from pepsin and HCl autodigestion by binding with protein substrate. No differences were found in the sialic acid contents in controls and phenylbutazone-treated pigs, but no sialic acid at all was found in the pig with the spontaneous gastric ulcer.

6619 EXPERIMENTAL GASTRIC ULCERS AND UROPEPSINOGEN EXCRETION IN THE RAT. (E.) Coppi, G. (De Angeli Inst. Res. Labs., Milan, Italy), G. Bonardi and M. Gaetani. *J. Pharm. Pharmacol.* 23(9):722-723, 1971.

Groups of Sprague-Dawley rats with gastric ulcers induced by reserpine (5 mg/kg i.p.)- or phenylbutazone were treated p.o. with either atropine sulfate (10 mg/kg p.o.) or oxyphencyclimine hydrochloride (10 mg/kg p.o.). Further groups of normal rats were treated with hydrochlorothiazide (5 mg/kg p.o.); liver damage was produced by CCl_4 (4 mg/kg i.p.) and a monolateral renal lesion by the method of Coppi, Bonardi and Fresia. Neither the excretion of uropepsinogen nor the integrity of the gastric mucosa was affected by hydrochlorothiazide, CCl_4, or the renal lesion. The excretion of uropepsinogen was increased in animals with gastric ulcers of any etiology. Oxyphencyclimine and, to a lesser extent, atropine decreased the ulceration index and the excretion of uropepsinogen in rats given reserpine or phenylbutazone; in these groups there was generally a direct relationship between the level of uropepsinogen excretion and the severity of the gastric lesion.

6620 GASTRIC PSEUDOTUMOR AFTER FUNDOPLICATION. (E.) Ettinger, A. (New England Med. Ctr. Hosps., Boston, Mass.), R. E. Paul, Jr. and J. M. Moran. *Gastroenterology* 61(3):299-304, 1971.

The pseudotumor which results from the transthoracic Belsey Mark LV operation and the transabdominal Nissen procedure (for gastroesophageal reflux or hiatal hernia) is located at the upper medial aspect of the gastric fundus and projects into the stomach air bubble, often in dramatic contrast. Such a pseudotumor was observed in 33 of 34 patients studied. Comparison of postoperative chest or barium contrast study with later barium examination revealed regression of the pseudomass, usually most rapid during the first 2-3 months following surgery. After this time the pseudomass remains essentially permanent. The initial size of the pseudomass is determined by the amount of gastric fundus used for plication and by the accompanying tissue swelling caused by surgical trauma. The subsequent early diminution in the size of the pseudotumor is related to postoperative absorption of edema and blood.

6621 HISTOLOGIC APPEARANCE OF GASTRIC CARCINOMA IN HIGH AND LOW MORTALITY COUNTRIES: COMPARISON BETWEEN KYUSHU, JAPAN AND MINNESOTA, U.S.A. (E.) Kubo, T. (Palmerston North Hosp., New Zealand). *Cancer* 28(3):726-734, 1971.

The histology of gastric carcinoma surgically resected from 800 Japanese and 627 American patients were compared to determine whether there is a geographic difference in histological appearances. In 553 Japanese males and 428 American males, the ratio of adenocarcinoma to diffuse carcinoma was 1.81 and 2.65, resp. In female patients, the adenocarcinoma to diffuse carcinoma ratio was 1.01 in Japanese and 1.86 in Americans. The incidence of adenocarcinoma was comparatively high among Americans. In both national groups and with both sexes, the predominance of diffuse carcinoma was evident among the younger age groups, the incidence of adenocarcinoma increasing with age. The adenocarcinoma to diffuse carcinoma ratios in Americans and Japanese patients were almost identical in age groups 40-69 in males and 40-59 in females. In all groups, adenocarcinoma was the predominant type in patients over 50 yr of age, while diffuse carcinoma was usually found in patients younger than 50 yr.

6622 PATHOGENETIC CONSIDERATIONS IN A PATIENT WITH AN ASSOCIATION OF GASTRIC CARCINOMA WITH LYMPHOID LEUKEMIA. (It.) Renzi, G. (Civil Hosp., Rimini, Italy). *Rif. Med.* 85(18):485-489, 1971.

6623 COEXISTENCE OF A LIPOMA AND ULCER OF THE STOMACH. (Pol.) Kwiatkowski, C. (Med. Acad Ist. Surg. Clin., Gelansk, Poland) and J. Iwanik. *Pol. Przegl. Chir.* 43(3):515-517, 1971.

6624 ANATOMICAL CHANGES LEADING TO PROLAPSE OF THE GASTRIC MUCOSA. (Ger.) Wenzel, H. J. (Free U. Berlin Westend Clin.). *Virchows Arch.* [*Pathol. Anat.*] 353(2):128-140, 1971.

6625 LIPOMA OF THE STOMACH. REPORT OF A CASE. (Dan.) Thomassen, H. (Vejle Hosp., Denmark). *Ugeskr. Laeger* 133(14):649-651, 1971.

6626 THE TREATMENT OF HYPOCHLORHYDRIA WITH A NEW SECRETAGOGUE. (It.) Pugliese, F. (Maggiore Hosp. San Giovanni Battista, Turin, Italy) and A. Lo Presti. *Minerva Med.* 62(1-2):5-18, 1971.

6627 AN ASSOCIATION OF BEZOARS WITH PEPTIC ULCER. (Rus.) Bonk, G. M., L. A. Budzinskii and I. P. Krasnoschekov. *Vestn. Rentgenol. Radiol.* 46(3):85-87, 1971.

6628 LOCALIZED LESIONS IN THE STOMACH OF CHILDREN. (E.) Singleton, E. B. (St. Luke's Episcopal Hosp., Houston, Tex.) and B. A. King. *Semin. Roentgenol.* 6(2):220-234, 1971.

6629 MISCELLANEOUS GASTRIC LESIONS. (E.) Levin, B. (Michael Reese Hosp. Med. Ctr., Chicago, Ill.). *Semin. Roentgenol.* 6(2):193-206, 1971.

6630 ANGIOGRAPHY OF LOCALIZED GASTRIC LESIONS. (E.) Baum, S. (U. Pennsylvania Sch. Med., Philadelphia). *Semin. Roentgenol.* 6(2):207-219, 1971.

6631 POSTOPERATIVE DEFECTS OF THE STOMACH. (E.) Joachim Burhenne, H. (U. California Med. Ctr., San Francisco). *Semin. Roentgenol.* 6(2):182-192, 1971.

6632 POLYPOID LESIONS OF THE STOMACH. (E.) Marshak, R. H. (Mt. Sinai Sch. Med., New York, N. Y.) and A. E. Lindner. *Semin. Roentgenol.* 6(2):151-167, 1971.

6633 PROXIMAL SELECTIVE VAGOTOMY AND THE INTRAOPERATIVE TEST FOR CONTROLLING SECTIONING OF THE VAGUS. (Fr.) Grassi, G. (St. Spirito Inst., Rome). *Presse Med.* 79(17):768-770, 1971.

6634 PRIMARY TUBERCULOSIS OF THE STOMACH. (Sp.) Matteucci, P. (Sch. Med., Montevideo, Uruguay), D. Tomalino, J. Cassinelli and M. Jaureguy. *Cir. Uruguay* 40(1):21-27, 1970.

6635 CARCINOMA OF THE GASTRIC STUMP AFTER PARTIAL GASTRECTOMY IN CASES OF ULCERS. (Pol.) Zimnicki, Z. (Med. Acad. Ist. Surg. Clin., Lodz, Poland) and A. Waniek. *Pol. Przegl. Chir.* 43(2):161-165, 1971.

6636 PRIMARY CANCER OF THE GASTRIC STUMP AFTER GASTRECTOMY FOR ULCER. (Rum.) Oancea, T. (Cent. Milit. Hosp., Bucharest, Rumania), O. Bocaneala and G. Voicu. *Chirurgia (Bucur.)* 20(4):359-367, 1971.

6637 MALIGNANT GASTRIC GRANULOMATOSIS. (Rum.) Caloghera, C. (Inst. Med., Timisoara, Rumania), D. Bordos and L. Roth. *Chirurgia (Bucur.)* 20(4):343-348, 1971.

6638 CHRONIC GASTRITIS IN CONNECTIVE TISSUE DISORDERS. (Ger.) Apostoloff, E. (Ist Med. Charity Clin., Berlin), P. Reitzig, G. Lisewski and H. David. *Z. Gesamte Inn. Med.* 26(9):107-109, 1971.

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6679 SIX-HOUR FOOD AND BARIUM RETENTION. (E.) Stempien, S. J. (VA Hosp., Long Beach, Calif.), R. J. Tester and A. E. Dagradi. *Am. J. Dig. Dis.* 16(5):395-402, 1971.

See also numbers: 6525, 6533, 6562, 6569, 6579, 6684, 6687

6680 THE COURSE OF RECURRENT ULCER. (E.) Littman, A. (VA Hosp., Hines, Ill.) and D. H. Hanscom. *Gastroenterology* 61(4, Pt. 2): 592-597, 1971.

In this cooperative study at Veterans Administration Hospitals, 84 patients with recurrent gastric ulcers were re-admitted for another period of study. Recurrent ulcers generally were observed at the same site as the initial ulcer but were found to be smaller and to heal more rapidly. Size of recurrent ulcers varied directly with that of initial ulcers. The percentage of Negroes in this group was twice that in the initial study. Gastric carcinoma was detected initially at follow-up of recurrence in 2 patients. Of 73 in whom the initial recurrent ulcer was found to heal, 42.5% developed a second recurrence. Gastric adenocarcinoma was found in 2 (2.4% of recurrences), both of which ulcers were considered apparently benign and had been twice thought to have undergone apparent radiographic healing.

6681 SITE AND SIZE OF THE ULCER AS DETERMINANTS OF OUTCOME. (E.) Sun, D. C. H. (VA Hosp., Phoenix, Ariz.) and S. J. Stempien. *Gastroenterology* 61(4, Pt. 2):576-584, 1971.

In this study of gastric ulcers in Veterans Administration Hospitals, 88.3% were on the lesser curvature, 4.6% on the greater curvature, 1.3% on the anterior wall and 5.8% on the posterior wall. The antrum accounted for 42.9%, the body for 56.0% and the fundus for 1.1%. Large ulcers were most often located in the proximal stomach, small ulcers distally. The ulcer site did not correlate with either its ability to heal or tendency to become malignant. None of the 29 ulcers on the greater curvature was malignant. Ulcer width alone was as accurate an estimation of ulcer size as was the ulcer index (product of width and depth). Healing time varied directly with ulcer size. There was no relationship between ulcer size and liklihood of recurrence, but the authors point out that most small ulcers and fewer large ulcers heal satisfactorily and these were then at greater risk for recurrence.

6682 HEALING OF INITIAL ULCERS IN RELATION TO AGE AND RACE. (E.) Roth, H. P. (VA Hosp., Cleveland, Ohio). *Gastroenterology* 61(4, Pt. 2):570-575, 1971.

The 774 patients in the cooperative Veterans Administration Hospital study represented 64% of patients seen in these hospitals during this period with gastric ulcers. Of 638 in whom the response to medical therapy was followed throughout treatment, complete healing was seen radiographically in 294 at 3 weeks, in 155 by 6 weeks and in another 35 by 12 weeks for a total of 484 of 638 patients (75.9%). Of 154 whose ulcers failed to heal in this 12-week treatment period, 111 were randomized to further medical or surgical therapy, on the basis of failure of reduction of ulcer by 50% at 3 weeks or by 90% at 6 weeks. Of 62 first randomized to medicine, 26 healed and went to medical follow-up; of 49 initially randomized to surgery, 41 accepted and went to surgical follow-up. Age had no effect on size, location or frequency of healing of ulcers. In Negroes, there were fewer large ulcers, a higher recurrence rate and a higher rate of coexistent duodenal ulceration.

6683 CLASSIFICATION OF THE POST-GASTRECTOMY SYNDROMES BASED ON OBSERVATION OF 580 PATIENTS. (E.) Hirschowitz, B. I. (U. Alabama Sch. Med., Birmingham). *Ala. J. Med. Sci.* 8(1):50-66, 1971.

Classifications of postgastrectomy syndromes were based upon observations in 580 patients seen because of symptoms after surgery for peptic ulcer. Of 580 patients, 460 were males and nearly all were older than 30 yr. The greater majority (82%) of the patients had more than one symptom: the commonest symptoms being ulcer-like pain, atypical (not ulcer-like) pain, vomiting and bleeding, each being present in about 40% of patients. Weight loss and dumping occurred in about 30%. No single symptom or combination of symptoms was diagnostic of any particular lesion, though some, such as dumping, represented a discrete syndrome. The 15 diagnoses made (including Zollinger-Ellison syndrome stomal obstruction, double barrel stoma, hiatal hernia) were largely anatomical and reflected emphasis of this on X-ray, endoscopy and surgery. There were far fewer multiple diagnoses than there were multiple symptoms. Of 580 symptomatic patients, 17.5% were normal or undiagnosed by methods employed. Among major diagnoses, 23% had marginal, jejunal or gastric ulcer, 29% had stomatitis, and 4% had both. Ten percent of bleeders remained undiagnosed. Though 81% of patients with marginal ulcer had pain, only 30% of those with pain had a marginal ulcer. The delayed syndromes were classified according to the following headings: anatomical-mechanical, anatomical-pathological, metabolic-nutritional-physiological and miscellaneous.

6684 CANCER. PART I. CLINICAL ASPECTS. (E.) Wenger, J. (VA Hosp., Atlanta, Ga.), L. L. Brandborg and F. A. Spellman. *Gastroenterology* 61(4, Pt. 2):598-605, 1970.

Cancer was found in 25 of 638 patients (3.9%) with gastric ulcers in this cooperative study from Veterans Administration Hospitals. There was no apparent relationship between age and malignancy. Those with malignant ulcers had both a shorter duration of symptoms at initial diagnosis of ulcer disease and a shorter length of ulcer history. Of 574 with an initial X-ray diagnosis of benign, 19 (3.3%) were found to be malignant, while of 64 with an initial diagnosis of indeterminate, 6 (9.4%) were later found malignant. The incidence of malignancy was 2.2% with an ulcer index (product of width and depth) less than 301 mm^2 and 10.7% with an index greater than this. In the absence of coexistent duodenal ulcer disease, the incidence of malignancy was 6.0% while, in its presence, the incidence was only 1.2%. Of the 25 cases, 21 were diagnosed during an initial 12-week period of therapy and the remaining 4 were diagnosed during follow-up and were thought to represent healed malignant ulcers.

6685 MULTIPLE GASTRIC ULCERS. (E.) Boyle, J. D. (VA Hosp., Los Angeles, Calif.). *Gastroenterology* 61(4, Pt. 2):628-631, 1971.

Of 653 usable cases of gastric ulcers in the cooperative study from Veterans Administration Hospitals, only 15 patients (2.3%) had multiple gastric ulcers. Two ulcers were noted in 13, 3 in 1, and 4 in 1. In 13 both ulcers were classified as benign, while in the other 2 they were indeterminate. Gastroscopy was performed in 14 patients with 31 ulcers and 17 of these ulcers were seen. There were no significant differences between those with coexistent duodenal ulcer, size of ulcer, frequency of recurrence or single and multiple ulcers with respect to age, race or output of gastric acid. Of the 33 identified ulcers, 16 (48.5%) were in the antrum, 9 (27%) were in the body, 1 (3%) was in the fundus, and the locations of the rest were not specified. Three (9%) of the multiple ulcers were located along the greater curvature, compared with only 1.8% in those with single ulcers.

6686 IN "DEFENSE" OF THE GASTRIC MUCOSA. (E.) Lipkin, M. (Cornell U. Med. Coll., New York, N. Y.). *Gut* 12(7):599-603, 1971.

Reasons for the resistance of normal gastric mucosa to self-digestion are discussed. A variety of experiments have suggested that nutritional factors and normal intake of dietary protein, as well as growth hormone help to maintain this resistance of the mucosal cells against ulceration. Also postulated for many years has been the first line of defense against mucosal injury, the mucus layer provided by the epithelial cells of the stomach. This layer of mucus, together with the second line of defense, the healthy epithelial cells themselves, have been thought to play a significant role in defense of the mucosa against injury and ulceration. Carbenoxolone, which has been used successfully in the treatment of peptic ulcer disease, has increased mucus production and has affected the rate of flow and extrusion of gastric epithelial cells from the mucosa. Among experimental models, the incidence and severity of restraint-stress-induced erosions were decreased by pretreatment with carbenoxolone, coincident with both the appearance of excessive mucosubstance in the gastric epithelial cells and a decreased rate of loss of thymidine-^{3}H-labeled epithelial cells from the gastric mucosa. Dynamic properties of the cell membranes following contact with carbenoxolone may be responsible for the initiation of internal signals needed for replication.

6687 PART II. RADIOLOGICAL ASPECTS OF CANCER AFTER APPARENT HEALING. (E.) Kirsh, I. E. (VA Hosp., Hines, Ill.). *Gastroenterology* 61(4, Pt. 2):606-621, 1971.

Cases are reviewed of 4 patients in whom gastric carcinoma was found after apparent healing of an initial ulcer detected and treated during a 12-week therapeutic program in a cooperative study of Veterans Administration Hospitals. In retrospective review of initial films, the most frequent signs of malignancy were a filling defect and effacement of the folds. The filling defect was sometimes in the crater itself, most often at its upper or lower margin. In some cases after healing of the ulcer a filling defect could be seen at the original site. Retrospectively, some of the films showed the criteria of malignancy described by Gutmann, including 'niche encastree', 'niche en plateau' and 'grosse niche triangulaire'. All cases violated the previously held dictum that projection of a crater beyond the gastric border is a sign of benignity. The author stresses that malignant ulcers never really heal and should be carefully sought after with relief films, a less dense barium suspension and high penetration X-rays.

6688 SELECTIVE GASTRIC VAGOTOMY WITH ANTRECTOMY OR PYLOROPLASTY. (E.) Sawyers, J. L. (Vanderbilt U. Sch. Med., Nashville, Tenn.) and H. W. Scott, Jr. *Ann. Surg.* 174(4): 541-547, 1971.

The use of selective gastric vagotomy with antrectomy or pyloroplasty in the treatment of 79 patients with duodenal ulcer disease was evaluated. Good to excellent results were obtained in patients following selective gastric vagotomy and antrectomy or pyloroplasty. Most patients had excellent gastrointestinal function and nutritional conditions, and no ulcer symptoms, but occasionally experienced epigastric fullness after meals, mild dumping symptoms and mild diarrhea. Postoperative insulin (Hollander) tests were performed in 66 patients, 33 with antrectomy and 33 with pyloroplasty. Almost 90% of these showed negative results (with only 1 recurrent ulcer) and indicated lesser degrees of acid stimulation. Selective gastric vagotomy (although a more difficult technique) seems to be superior to truncal vagotomy in treatment of duodenal ulcer disease and this procedure with pyloroplasty affords patients equally good clinical results and selective gastric vagotomy with antrectomy, as opposed to previous studies with truncal vagotomy.

6689 THE VALUE OF THE INSULIN TEST IN PREDICTING RECURRENCE AFTER VAGOTOMY AND DRAINAGE FOR DUODENAL ULCER. (E.) Kronborg, O. (Bispebjerg Hosp., Copenhagen). *Scand. J. Gastroenterol.* 6(5):471-478, 1971.

An assessment of 500 patients was made to determine the value of the insulin test in predicting the risk of recurrence of duodenal ulcer after truncal vagotomy and drainage. Follow-up was made after 3-4 yr, and several associations were found between the insulin test performed 10 days after operation and clinical indications for reoperation. Of the 500 patients in the study, 60 did not have the insulin test performed 10 days after the original surgery and 72 patients were excluded from the final study. Those 27 patients with recurrence were included in the correlation study. The reliability of 7 criteria in distinguishing between recurrence and nonrecurrence was good according to sensitivity and specificity, and thus had a high discriminative ability, but small predictive value in diagnosis of recurrence. Simple discriminative analysis of fasting, spontaneous, and insulin-activated secretion was used. The reliability of the 7 criteria on distinguishing between recurrence and non-recurrence was good. Of 80 patients with 4 to 7 positive criteria, 17 recurrences were found as contrasted to 311 patients with less than 4 positive criteria among whom 4 recurrences were found. Additional follow-up is planned to assess the value of the criteria in predicting recurrence after 3-4 yr.

6690 PREVENTION OF DUODENAL ULCERS BY ADMINISTRATION OF PROSTAGLANDIN E_2 (PGE_2). (E.) Robert, A. (Upjohn Co., Kalamazoo, Mich.), D. F. Stowe and J. E. Nezamis. *Scand. J. Gastroenterol.* 6(4):303-305, 1971.

Chemically-induced ulcers were prevented when Prostaglandin E_2 (PGE_2) was infused s.c. into rats treated simultaneously with duodenoulcerogenic doses of the secretogogues, histamine + carbachol, pentagastrin + carbachol, or pentagastrin + histamine. Duodenal ulcers were produced by the two gastric secretogogues, and were localized only in the duodenum. They were usually multiple and duodenal perforations occurred in many instances. S.c. infusion of PGE_2 into animals treated simultaneously with secretogogues, and for the same time interval, prevented ulcer formation, and the degree of inhibition was dose-dependent. None of the control animals infused with saline plus vehicle showed any gastroduodenal lesions. It is suggested that since prostaglandins reduce gastric secretion in rats the antiulcer effect of PGE_2 may be due to antisecretory activity. The mechanism by which prostaglandins show antisecretory and antiulcer effects is not known.

6691 RECURRENT PEPTIC ULCER FOLLOWING PRIMARY OPERATIONS WITH VAGOTOMY FOR DUODENAL ULCER. RESULTS OF SURGICAL TREATMENT IN 42 PATIENTS. (E.) Stuart, M. and S. O. Hoerr (Cleveland Clin., Ohio). *Arch. Surg.* 103(2):129-132, 1971.

Forty-two patients were subjected to a second surgical procedure after failure to respond to definitive surgery for chronic duodenal ulcer. Prior surgery, always including vagotomy, consisted of gastroenterostomy (16), gastrectomy (10) or pyloroplasty (16). The second procedure in each case was gastric resection (even with prior gastrectomy) and revision of any technical faults of prior surgery. Pathology observed at reoperation consisted of active ulcers in 26 (gastroenterostomy, 12; gastrectomy, 8; pyloroplasty, 6), gastroduodenitis in 6 (1:1:4) or healed ulcer with scarring in 10 (3:1:6). The symptom-free interval between the initial procedure and the first recurrent symptoms was less than 1 yr in 26 (7:6:13), 1-3 yr in 7 (2:3:2), and more than 3 yr in 9 (7:1:1). The principal indication for reoperation was intractability in 25 (11;8;6), hemorrhage in 6 (3:1:2), outlet obstruction in 8 (0;0;8), gastrojejunocolic fistula in 2 (1;1;0), and dumping syndrome in 1 (1;0;0). Technical faults at reoperation consisted of residual vagal fibers (15), retained gastric antrum (2), and enteroanastomosis below gastroenterostomy (3). During a follow-up period of up to 20 yr, 25 had good results (13;5;7), while 8 had unsatisfactory results without recurrent ulcer (1;1;6) and 7 had proven recurrence of ulcer (2;3;2).

6692 PEPTIC ULCERATION AND THE USE OF ORAL CONTRACEPTIVES. A NEGATIVE CORRELATION ATTRIBUTABLE TO THE DISEASE? (E.) Glober, G. (NCI, Bethesda, Md.), R. Doll, A. S. Fairbairn and M. P. Vessey. *Br. J. Prev. Soc. Med.* 25(3):144-146, 1971.

The association of oral contraceptives containing estrogen and the risk of peptic ulceration was examined in 46 married women with peptic ulcers, and in 90 matched controls. Of 45 patients with peptic ulcer that were matched with controls, none had used oral contraceptives during the 3 months prior to hospital admission, while 12 of the 90 (13.3%) control patients had done so. Use of other methods of contraception was also less frequent in peptic ulcer patients as compared to controls. When compared as to frequency use of oral contraceptives in only those patients who used some method of birth control, the difference between the two groups was no longer statistically significant. Four of 29 patients with ulcers stated they were too ill to have intercourse and another 11 stated their illness had interrupted their normal living pattern. The results indicate that patients with peptic ulcerations are less likely to use oral contraceptives due to a reduction in frequency of sexual intercourse related to the severity of the disease, and it is unwarranted to attribute any protective affect of oral contraceptives against peptic ulcers.

6693 PEPTIC ULCER DISEASE AFTER CHOLEDOCHOJEJUNOSTOMY. (E.) McArthur, M. S. (U. California Sch. Med., Los Angeles) and W. P. Longmire, Jr. *Am. J. Surg.* 122(2):155-158, 1971.

The effect of Roux-en-Y choledochojejunostomy on peptic ulcer formation was studied in 97 patients who underwent this procedure for benign extrahepatic biliary obstruction. In 39 patients significant complications, including peptic ulcer, cholangitis, infection, or significant abdominal pain of unknown cause, developed. Peptic ulcer developed postoperatively in 10 patients (9 duodenal, 1 gastric) who had no demonstrable ulcer disease or symptoms prior to the development of obstruction. Ten other patients had upper abdominal pain suggestive of possible ulcer disease, but etiology was never established. The diagnosis of peptic ulcer was established radiologically, at reoperation, or at autopsy. Preoperative evaluation of peptic ulcer potential seems warranted, and postoperative protection of patients with a proclivity to ulcer disease seems essential.

6694 GASTROSCOPY. (E.) Fruin, R. C. (VA Hosp., Hines, Ill.). *Gastroenterology* 61(4, Pt. 2):632-634, 1971.

Of 754 patients with a single initial ulcer studied, 601 (79.7%) were subjected to gastroscopy with visualization of the ulcer in 301 (50.1%) of these. Whether or not the ulcer was visualized did not differ in patients examined at various intervals before and after the initial X-ray study. Gastroscopy was performed within 10 days of the index X-ray study in 439 (58.2%). The percentage of ulcers visualized was 30.4% in the antrum, 68.1% in the body and 25.0% in the fundus. The percentage visualization of ulcers also increased with ulcer size. Gastroscopy was performed in 89 of 511 patients (17.4%) within a few days after radiographic demonstration of apparent healing and 19 (21.3%) showed a shallow residual defect. Of the 19, 5 had a recurrent ulcer at the 1-month examination, 3 at 3 months and 4 at 6-24 months, while 10 had no recurrences during 2 years of observation. Of a total of 23 in the initial sample with single ulcers who had cancer, 18 had been gastroscoped. In these, the ulcer was seen in 6, of which 3 were called benign, 3 indeterminate and none malignant. There were 3 cases of false-positive diagnosis of cancer by gastroscopy.

6695 THE EFFECT OF HEALING ON BILE REFLUX IN GASTRIC ULCER. (E.) Black, R. B. (Welsh Natl. Sch. Med., Cardiff), G. Roberts and J. Rhodes. *Gut* 12(7):552-558, 1971.

Bile acid concentrations were measured in the gastric juice of patients with active ulcers, and later when the ulcers were healing or healed, and compared with those in normal controls. In the patients with active gastric ulcers, concentrations of bile acids were higher in both fasting and maximal postprandial states (0-3.2 mM and 0.1 - 7.4 mM), resp. than in the normal control group (0 -0.12 mM fasting; 0 - 0.48 mM), however, some overlap was observed. Bile reflux patterns were markedly different between these 2 groups. Results in patients with duodenal abnormality and gastric ulcer did not differ from the results in patients with active gastric ulcers only. Patients with healed or healing ulcers exhibited bile acid concentrations similar to those observed in patients with active ulcers. Healing did not affect bile reflux in any consistent way. A comparison of results from patients when their ulcers were active and healing showed a slight fall in the mean bile acid concentration with healing. This difference was not significant for the maximal postprandial levels and marginally significant for fasting levels.

6696 THE EFFECT OF DIAZEPAM ON HUMAN GASTRIC SECRETION. (E.) Birnbaum, D. (Hadassah Hebrew U. Hosp., Jerusalem), F. Karmeli and M. Tefera. *Gut* 12(8):616-618, 1971.

Thirty to 90 min after an oral dose of diazepam (10 mg), a significant decrease in volume and in acid output was observed in patients with duodenal ulcer, when compared with the preceding collection of basal gastric secretion. The inhibitory effect was observed during the 5 hr of the experiment. The observed decreases in both volume and acid secretion after parenteral administration of 10 mg of diazepam were statistically significant when compared with those after placebo. Administration of diazepam following the ingestion of calcium carbonate (840 mg) caused a prolongation of achlorhydria from 22 to 37 min. The lack of side effects which are observed with diazepam allows an increase in the dose which may result in a comparable "medical vagotomy" during the night hr. Thus, diazepam seems to be beneficial in ulcer therapy.

6697 POSSIBLE RELATIONSHIP BETWEEN SMOKING AND PEPTIC ULCER. (E.) Robert, A. (Upjohn Co., Kalamazoo, Mich.), D. F. Stowe and J. E. Nezamis. *Nature (Lond.)* 233(5320):497-498, 1971.

The effect of esophageal infusion of acid, acid and nicotine, and nicotine and saline on the development of duodenal ulcers produced by pentagastrin and carbachol was studied in rats to determine a possible relationship between smoking and peptic ulcer. When acid alone was perfused, duodenal ulcers were found in 31% of animals. When nicotine sulfate was also given the incidence reached 93%. The ulcers in the animals treated with acid and nicotine were also more numerous and more severe than those in animals receiving acid only. Nicotine alone produced no ulcers. Nicotine seemingly sensitizes the duodenum to the ulcerogenic property of acid flowing through the stomach. Nicotine absorbed chronically through smoking may contribute to ulcer formation and to ulcer recurrences by reducing secretion of alkaline pancreatic juice in response to secretin.

6698 EFFECT OF HISTAMINE AND ASPIRIN ON HEALING OF STANDARDIZED GASTRIC ULCERS IN DOGS. (E.) Sugawa, C. (Wayne State U. Sch. Med., Detroit, Mich.), C. E. Lucas and A. J. Walt. *Surgery* 70(4):590-595, 1971.

Gastric ulcers were produced by intragastric acetic acid injection in dogs. Gastroscopic examination showed that while the rate of healing of ulcers was significantly slower after histamine injection than in controls, the histologic appearance was identical. In the nonulcerated mucosa, histamine injections caused diffuse erosions measuring 1-7 mm in diameter and 1-2 mm in depth in all animals. In this group, periodic acid-Schiff staining of the superficial mucosa cells was markedly decreased throughout the stomach but most strikingly in the antrum. In the group which received aspirin, antral ulcers healed at the same rate as the control ulcers. The ulcers in the body of the stomach, however, showed significantly delayed healing. The histologic pattern was identical to that of the control ulcers. Within a week of aspirin administration, 7 of 8 dogs developed black-based erosions measuring 1-8 mm in diameter and up to 1 mm in depth in the body of the stomach. Mucin deficiency during aspirin and histamine therapy may play a role in the delayed healing of ulcers in the body of the stomach.

6699 GASTRIC ULCER AND GASTRITIS. (E.) Gear, M. W. L. (Gloucestershire Roy. Hosp., England), S. C. Truelove and R. Whitehead. *Gut* 12(8):639-645, 1971.

Biopsies were taken from each of 4 standard sites in the stomachs of 95 patients with untreated or treated (medically or surgically) gastric ulcer, using a fiberoptic gastroscope, to study the gastritis associated with chronic gastric ulcer. Ulcers of the body of the stomach were associated with more extensive and more severe gastritis than ulcers of the prepyloric region. Prepyloric ulcers were associated with gastritis which was localized to the distal biopsy sites and was often superficial with little evidence of atrophic changes or metaplasia. The difference in gastritis between the 2 ulcer types persisted after the ulcer was healed, whether treatment was medical or surgical. The distribution of gastric mucosal changes after treatment was similar to that found in untreated gastric ulcer. Severe atrophic gastritis and intestinal metaplasia were found most frequently in prepyloric and mid-lesser curve biopsy sites, and tended to spread proximally in treated gastric ulcer, particularly after surgery. The overall frequency of severe changes was also increased in the treated group whether surgical or medical. Thus, gastritis may be the basic disease process and gastric ulceration is a secondary phenomenon.

6700 STATUS OF DUODENAL ULCER PATIENTS TEN YEARS OR MORE AFTER VAGOTOMY-PYLOROPLASTY (V-P). (E.) Stempien, S. J. (VA Hosp., Long Beach, Calif.), A. E. Dagradi, E. R. Lee and J. H. Simonton. *Am. J. Gastroenterol.* 56(2):99-108, 1971.

The long-term results and effects of vagotomy-pyloroplasty (V-P) for duodenal ulcer were evaluated in 161 duodenal ulcer patients who had survived 10 yr or more after this procedure. The results were considered satisfactory when there was no recurrence of ulcer, and no postoperative sequels, or postoperative sequels that were nondisabling, minimal, or responsive to treatment. The overall clinical results after initial V-P were satisfactory in 68.3% of these cases. When the patients were divided into a military service-connected group (SC) and a non-service connected (NSC) group, the SC group results were satisfactory in 50%, but in the NSC group they were satisfactory in 80%. Peptic ulcer recurrences were noted in 44 patients (27.3%), with recurrence rates of 40.6% in the SC group and 18.5% in the NSC group, all of these being associated with incomplete vagotomy. Postoperative sequels accounting from unsuccessful results also showed a significantly higher incidence in the SC group. The SC veteran patient seems to resist surgical solution to his ulcer problem.

6701 ELECTRICAL STIMULATION AND INSULIN TESTS USED WITH BILATERAL SELECTIVE VAGOTOMY. (E.) Hollanders, D. (Burnley Gen. Hosp., England). *Gut* 12(8):629-631, 1971.

The results of insulin tests performed 10 days and 6-30 weeks after vagotomy were compared and the usefulness of the electrical test as compared with the insulin test was assessed in 50 patients with chronic duodenal ulceration. In 5 cases the electrical stimulation test indicated that the surgeon had been unable to complete vagotomy (positive result). The first insulin test, performed on or about the tenth postoperative day, provided only 1 late positive response, according to the criteria of Hollander, and that in a patient whose electrical test was negative. In a second test of 27 patients, 2 had positive electrical stimulation tests and 9 had positive insulin tests (including the patient who had a positive insulin test previously). Of the 8 cases which became positive, only 1 had a positive electrical stimulation test result. A third insulin test performed on 3 patients yielded the same results as the second test. The routine use of the electrical test in these patients seemingly increased the incidence of adequate nerve section.

6702 SUCCINIC DEHYDROGENASE ACTIVITY IN SOME TYPES OF EXPERIMENTAL ULCER. (Rum.) Szilagyi, H. (Inst. Pharm. Med., Cluj, Rumania) and C. Mihailov. *Spitalul* 84(1):75-78, 1971.

6703 VAGOTOMY IN DUODENAL ULCER. (Ger.) Eckmann, L. (Tiefenau Hosp., Bern, Switzerland). *Schweiz. Med. Wochenschr.* 101(15): 525-530, 1971.

6704 INFLUENCE OF XYLAMIDE ON BASAL AND PENTAGASTRIN STIMULATED GASTRIC SECRETION IN PATIENTS WITH DUODENAL ULCER. (Por.) Assumpcao Bicalho, S. (Fed. U. Minas Gerais Sch. Med., Belo Horizonte, Brazil) and L. De Paula Castro. *Rev. Assoc. Med. Bras.* 17(2):57-59, 1971.

6705 POSTOPERATIVE GASTRIC DRAINAGE IN THE SURGERY OF GASTRODUODENAL ULCER. (Sp.) Perez Inigo Quintana, F. (Milit. Hosp., San Sebastian, Spain). *Med. Cir. Guerra* 33(2):27-31, 1971.

6706 CARBENOXALONE DISODIUM SALT IN THE TREATMENT OF PEPTIC ULCER. (Ger.) Göbel, D. (Deaconess Hosp., Karlsruhe-Ruppurr, Germany) and S. Witte. *Med. Welt* 22(36):1394-1397, 1971.

6707 UNCOMPLICATED GASTRODUODENAL ULCER. (Fr.) Bonnet, J. L. *Rev. Infirm. (Paris)* 21(4):319-330, 1971.

6708 SURGICAL TREATMENT OF PEPTIC ULCER AND ITS COMPLICATIONS. (Hun.) Rubanyi, P. (Semmelweis Med. U., Budapest, Hungary). *Orvoskepzes* 46(2):98-102, 1971.

6709 STRESS ULCER. (It.) Valdoni, P. *Minerva Med.* 62(6):230-236, 1971.

6710 COMBINED GASTRIC AND DUODENAL ULCERS MANAGED BY VAGOTOMY AND DRAINAGE. (E.) Wasunna, A. E. O. (Western Infirm., Glasgow, Scotland), F. Kennedy, I. E. Gillespie and A. W. Kay. *Lancet* 1(7702):722-725, 1971.

6711 LATE RESULTS OF THE TREATMENT OF PERFORATING GASTRODUODENAL ULCERS BY THE METHOD OF CLOSURE AND PRIMARY RESECTION. (Rus.) Smirnov, B. V. *Khirurgiia (Mosk.)* 47(3):74-78, 1971.

6712 THE ACID FORMING FUNCTION OF THE STOMACH IN PEPTIC ULCER PATIENTS. (Rus.) Leia, I. I. *Khirurgiia (Mosk.)* 47(3): 55-61, 1971.

6713 CRITERIA OF CHOICE OF THE OPERATIVE TECHNIQUE IN PEPTIC ULCER PATIENTS. (Rus.) Myshkin, K. I. and L. A. Frankfurt. *Khirurgiia (Mosk.)* 47(3):50-55, 1971.

6714 SELECTIVE VAGOTOMY IN DUODENAL PEPTIC ULCERS. (Rus.) Arveladze, A. M., N. V. Antelava and V. G. Kurdovanidze. *Khirurgiia (Mosk.)* 47(3):46-50, 1971.

6715 PROXIMAL SELECTIVE VAGOTOMY. (Rus.) Fuks, B. I. and A. I. Getta. *Khirurgiia (Mosk.)* 47(3):42-46, 1971.

6716 THE TECHNIQUE OF VAGOTOMY AND RESECTION OF THE STOMACH IN PEPTIC ULCER. (Rus.) Saveliev, V. S. and O. A. Umbrumiants. *Khirurgiia (Mosk.)* 47(3):37-42, 1971.

6717 PEPTIC ULCER DISEASE. AN 11-YEAR STUDY. (E.) Todd, J. R., Jr. (George W. Hubbard Hosp., Nashville, Tenn.). *J. Natl. Med. Assoc.* 63(1):40-42, 1971.

6718 SURGICAL TREATMENT OF SIMPLE GASTRODUODENAL ULCERS. WHEN, HOW, WHY? (Fr.) Sarrazin, A., M. Mercadier and J. Cady. *Concours Med.* 93(12):2069-2081, 1971.

6719 CLINICAL AND ANATOMOPATHOLOGICAL OBSERVATIONS ON THE MALIGNANT DEVELOPMEN OF GASTRIC ULCER. (E.) Kourias, B. G. (Red Cross Hosp., Athens, Greece) and N. Papacharalampo *Arch. Fr. Mal. App. Dig.* 60(6-7):309-318, 1971.

6720 A STUDY ON A RELATIONSHIP BETWEEN THE ANATOMICAL CHARACTERISTICS OF THE GASTRODUODENAL JUNCTION AND THE LOCATION OF DUODENAL ULCER. (Jap.) Yoshikawa, K. (Jikei U. Sch. Med., Tokyo). *Nippon Heikatsukin Gakkai Zasshi (Jap. J. Smooth Muscle Res.)* 6(4):290-311, 1970.

6721 BLOOD CLOTTING CHANGES DURING GASTRIC RESECTION FOR ULCER DISEASE AND THE ROLE OF ENDOTRACHEAL ETHER ANESTHESIA IN THEIR

DEVELOPMENT. (Rus.) Nikishenko, A. and P. V. Lis. *Klin. Khir.* 51(4):49-53, 1971.

6722 POTASSIUM AND SODIUM CONCENTRATION IN THE BLOOD OF PATIENTS WITH DUODENAL ULCER DEPENDING ON THE CHARACTER OF GASTRIC SURGERY. (Rus.) Zhukov, B. P. *Klin. Khir.* 51(4):45-49, 1971.

6723 CAUSES OF SOME COMPLICATIONS AFTER GASTRIC RESECTION IN ULCER PATIENTS. (Rus.) Komakhidze, M. E., T. I. Akhmeteli and N. G. Dolidze. *Klin. Khir.* 51(4):42-44, 1971.

6724 SELECTIVE GASTRIC VAGOTOMY WITH DRAINAGE IN ULCER TREATMENT. (Rus.) Ratner, G. L. and I. M. Berezin. *Klin. Khir.* 51(4):33-37, 1971.

6725 SOME PECULIARITIES OF SURGICAL OPERATIONS FOR REPEATED PERFORATING GASTRIC AND DUODENAL ULCER. (Rus.) Mazurik, M. F. *Klin. Khir.* 51(4):30-33, 1971.

6726 REPEATED OPERATIONS AFTER GASTRIC RESECTION FOR ULCERS. (Rus.) Danovich, F. M. and V. I. Malkova. *Klin. Khir.* 51(4): 26-29, 1971.

6727 RADIOLOGICAL STUDY OF THE STATE OF THE STOMACH AFTER VAGOTOMY. (Rus.) Shekhter, I. A., I. V. Varshavskii and I. E. Berezov. *Vestn. Rentgenol. Radiol.* 46(3):21-29, 1971.

6728 CHANGES IN THE ONE-STAGE PROTHROMBIN TIME IN PATIENTS SUBJECTED TO TOTAL AND SELECTIVE VAGOTOMY FOR DUODENAL ULCER. (Pol.) Lewicki, K. (Med. Acad. 3rd Surg. Clin., Gdansk, Poland). *Pol. Przegl. Chir.* 43(4):559-563, 1971.

6729 PERFORATION OF DUODENAL ULCER INVOLVING THE HEPATIC ARTERY. (Pol.) Sawa, A. (Med. Acad. 1st Surg. Clin., Lublin, Poland) and D. Rakowska. *Pol. Przegl. Chir.* 43(4):631-634, 1971.

6730 BLEEDING DUODENAL ULCER IN A HEMOPHILIAC WHICH WAS CONTROLLED BY GASTRIC CRYOTHERAPY. (Pol.) Zalech, H. (Med. Acad. 3rd Surg. Clin., Lodz, Poland) and A. Joss. *Pol. Przegl. Chir.* 43(2):255-257, 1971.

6731 GASTROJEJUNOCOLIC FISTULA DUE TO BENIGN GASTRIC ULCER WITH NO PRIOR SURGERY. (E.) Friedman, I. H. (Beth Israel Med. Ctr., New York, N. Y.), H. Lozman, H. Pfeffer and S. Rokofsky. *NY State J. Med.* 71(8):884-886, 1971.

6732 BLEEDING DUODENAL ULCER DURING PREGNANCY. (E.) Deborja, C. (Jewish Hosp. Med. Ctr., Brooklyn, N. Y.), W. S. Calem and R. Pochaczevsky. *NY State J. Med.* 71(8):876-879, 1971.

6733 THE CONSERVATIVE TREATMENT OF PEPTIC ULCER IN THE AMBULATORY PATIENT IN GENERAL PRACTICE. (Ger.) Deyhle, P. (U. Erlangen-Nuremberg Med. Clin., Germany) and M. Classen. *Z. Allgemein Med.* 47(15):816-817, 1971.

6734 CORRELATIONS BETWEEN THE VALUE OF AUGMENTED HISTAMINE TEST, CLINICAL, AND X-RAY FINDINGS IN DUODENAL ULCER. (Ser.) Soljan, N. (Univ. Fac. Med. Sci., Zagreb, Yugoslavia). *An. Bolnice Dr. M. Stojanovic* 10(Suppl. 28):1-57, 1971.

6735 STIMULATION OF GASTRIC SECRETION WITH BETAZOLE (HISTALOG); COMPARISON WITH OTHER STIMULANTS OF THE GASTRIC MUCOSA. (Sp.) Cabellero Corvacho, J. (Natl. Med. Ctr. Pediatr. Hosp., Mexico City, Mexico). *Medicina (Mex.)* 51(1109):268-276, 1971.

See also numbers: 6523, 7111

6736 PREOPERATIVE DIAGNOSIS OF SMALL BOWEL VOLVULUS IN ADULTS. (E.) Juler, G. L. (U. California Dept. Surg., Irvine), E. A. Stemmer and J. E. Connolly. *Am. J. Gastroenterol.* 56(3): 235-247, 1971.

Forty cases of small bowel volvulus in the 40-70 yr age group, which accounted for 5% of cases of intestinal obstruction in a hospital, were studied. Eight cases had had no previous surgery and included 4 primary mid-small bowel volvulus around the superior mesenteric artery, 2 cancers and 2 congenital constricting bands. Thirty-two cases had had previous abdominal operations. Appendectomy and gastric surgery accounted for 50% of all surgeries. Adhesions or bands accounted for 75% of all cases. The ileum was the most common (60%) site of small bowel volvulus. Bowel infarction occurred in 42.5% of the cases. There was a 10% mortality rate. Most had an acute onset of crampy abdominal pain associated with early persistent vomiting. Abdominal distention was a late complaint in 35% of the cases. Generalized tenderness and absent or abnormal bowel sound were usually observed. Significant laboratory findings were leukocytosis and albuminuria. An average of 6 hr longer was required for diagnostic work-up in cases with infarction. Hesitancy had a role in the infarction and mortality rates, since patients with infarction arrived at hospital 4 hr sooner, yet arrived in the operating room 6 hr later than noninfarcted patients.

6737 PRE-ILEAL TRANSPOSITION OF COLON TO PREVENT THE DEVELOPMENT OF SHORT BOWEL SYNDROME IN PUPPIES WITH 90 PERCENT SMALL INTESTINAL RESECTION. (E.) Hutcher, N. E. (Med. Coll. Virginia, Richmond) and A. M. Salzberg. *Surgery* 70(2):189-197, 1971.

Resection of 90% of the small intestine followed by transposition of a segment of colon proximal to the remaining small intestine was performed in purebred beagle puppies in order to prevent the development of short bowel syndrome. Ten animals (Group II) with 90% small intestine resection had a 60% late nutritional mortality rate, with a mean time of death of 50 days and massive diarrhea and weight loss, although 4 animals showed progressive weight gain in time. Fourteen animals (Group III) underwent 90% resection plus colon transposition and showed no late mortality with a mean follow-up period of 220 days. These puppies all exceeded their preoperative weight and in one case exceeded the weight of non-operated controls (Group I) by 10%. Cinefluorographic studies revealed aperistaltic and nonobstructive transposed colons and all resected animals demonstrated a decreased transit time from pylorus to cecum, whereas Group III animals had a slower (15-30 min) transit time as compared to Group II (5-10 min). While the stools for Groups II and III were abnormal, those for Group III had a much firmer consistency, lower 24 hr weight and less fat excretion. Bacterial cultures revealed a more exuberant growth in Group III animals than Group II animals. Histological analyses of jejunal sections both at the time of resection and upon re-exploration were unremarkable. Colon transposition may be a reasonable alternative in the surgical management of the short bowel syndrome.

6738 CLINICAL AND IMMUNOLOGICAL STUDIES IN A CASE OF NODULAR LYMPHOID HYPERPLASIA OF THE SMALL BOWEL. (E.) Johnson, B. L., Jr. (U. California Sch. Med., Los Angeles), L. S. Goldberg, M. A. Pops and M. Weiner. *Gastroenterolog* 61(3):369-374, 1971.

Clinical, histological and immunological parameters were investigated in a 47-yr-old woman with hypogammaglobulinemia and nodular lymphoid hyperplasia (NLH) of the small bowel. The patient had diarrhea, giardiasis, recurrent sinopulmonary infections, delayed cutaneous hypersensitivity and generalized hypogammaglobulinemia as well as NLH of the jejunum. Immunological studies revealed marked deficiencies of serum IgG, IgA, and IgM levels and lymphocyte function was normal. Histologic sections of the jejunum showed the lymphoid nodule to contain immature lymphocytes, reticulocytes, and histiocytes. Immunoglobulins were not identified in a typical lymphoid nodule when examined immunofluorescently for immunoglobulins A,G and M. Although IgA was found to be present in the patient's concentrated saliva, its absence is not a prerequisite for development of NLH. The diarrhea markedly improved with quinacrine therapy. The parameters studied in this patient provided no explanation as to the pathogenesis of NLH and like other enteropathies associated with deficiencies of the immune system may have varying degrees of clinical, immunological and histological expression. However, the absence of giardiasis with quinacrine and subsequent halting of gastrointestinal symptoms implies that this pathogen may be important in the production of symptoms in the syndrome presented.

6739 ULTRASTRUCTURAL LOCALIZATION OF IRON IN THE HUMAN JEJUNUM IN IRON OVERLOAD (BANTU SIDEROSIS). (E.) Theron, J. J. (Natl. Inst. Nutr. Dis., Pretoria, South Africa) and R. C. P. M. Mekel. *Br. J. Haematol.* 21(2): 165-171, 1971.

Light and electron microscopic studies were performed on jejunal biopsies taken from 22 patients with advanced Bantu siderosis. Dense deposits of hemosiderin were found in the cells of the lamina propria (especially the macrophages) in all biopsies examined with light microscopy.

Lymphocytes and plasma cells in the lamina propria did not contain demonstrable iron deposits. In the apical part of the cytoplasm of the jejunal absorptive cells, large numbers of round, dense bodies were seen. These bodies corresponded to the dense membrane-bound ferritin bodies, the apical vesicles and the Golgi vesicles in which the ferritin-iron was deposited. The ferritin bodies which were shown to contain acid phosphatase were identified as lysosomes. The epithelial intercellular spaces, the cells of the lamina propria and the lumina of the capillaries also were found to contain ferritin molecules. Jejunal epithelial cells contained electron-dense material thought to be hemosiderin in the Golgi cisternae of the concave face of the Golgi complex.

6740 THE PEUTZ-JEGHERS SYNDROME. REPORT OF TWO CASES, ONE WITH 30-YEAR FOLLOW-UP. (E.) McKittrick, J. E. (Santa Barbara Med. Clin., Calif.), W. M. Lewis, W. A. Doane and W. H. Geriwg, Jr. *Arch. Surg.* 103(1):57-62, 1971.

Two cases are briefly reported, one requiring multiple laparotomies over 25 yr, and the authors stress the preference for multiple polypectomies over resection when surgery is required. They do not recommend elective surgery for asymptomatic polyps in the stomach, duodenum or small intestine.

6741 TRANSCECAL ILEOSTOMY. (E.) Chaimoff, D. (Beilinson Hosp., Petah Tikva, Israel) and M. Dintsman. *Arch. Surg.* 103(4): 487-489, 1971.

A simple method combining cecostomy and ileostomy is described in 6 patients in whom prolonged drainage of the small intestine was necessary. The method involves the insertion of highly perforated plastic drain tube through the cecum wall (usually in the taenia coli) and the Bauhin's valve into the small intestine. The cecum is closed with a triple circular suture after which the cecum is sutured around the opening of the lateral abdominal wall, through which the tube passes outwards, to fix it firmly and prevent any leakage into the abdominal cavity. The tube can be withdrawn, after which the cecal opening may close within a few days. Of the 6 patients treated, there was no mortality which could be related to the procedure itself, and the treatment was considered successful. The tube was usually removed after 10 days, with rapid healing of the incision. In none of the cases was drainage prolonged for more than 10-14 days following removal of the tube. This method is easily performed and seems to ensure against immediate leakage as well as the possibility of future obstruction.

6742 POLYARTHRITIS IN OBESE PATIENTS WITH INTESTINAL BYPASS. (E.) Shagrin, J. W. (Henry Ford Hosp., Detroit, Mich.), B. Frame and H. Duncan. *Ann. Intern. Med.* 75(3):377-380, 1971.

Seven of 31 patients who had intestinal shunts for the control of obesity developed articular symptoms. All patients with bone problems had undergone jejunocolostomy; no subject undergoing jejunoileostomy developed articular symptoms. There was no correlation between stool number and articular complaints. The principal joints affected were the hands, wrists, and ankles, differing somewhat from the sites most commonly involved in the arthropathy of ulcerative colitis and regional enteritis (knees, sacrum, I-P joints). In 5 patients the duration of articular symptoms was several months, and resolution was complete with no apparent residual changes. In 2 patients a rheumatoid pattern of arthritis developed, lasting over 24 months. In 1 patient, because of severe articular symptoms, reconstitution of the bowel to normal anatomical sequence was performed with subsequent relief and resolution of symptoms. The abnormal position of the bowel promoted the development of arthritis in this patient in some way. When evaluating the total morbidity of surgical shunt procedure for obesity, the possibility of intestinal bypass leading to an arthropathy must be considered.

6743 EXPERIENCE WITH A NEW TECHNIC OF INTESTINAL BYPASS IN THE TREATMENT OF MORBID OBESITY. (E.) Scott, H. W., Jr. (Vanderbilt U. Med. Ctr., Nashville, Tenn.), H. H. Sandstead, A. B. Brill, H. Burko and R. K. Younger. *Ann. Surg.* 174(4):560-572, 1971.

A clinical and metabolic appraisal of 12 massively obese patients treated by jejunoileal bypass is presented. In 9 patients the large abdominal wounds healed per primam without evidence of seroma or infection; however, subcutaneous wound infections developed in 3 patients necessitating reopening of the incision. Low fat diet, restriction of fluids with meals and diphenoxylate hydrochloride (5 mg) 3-4 times a day resulted in control of the diarrhea observed during the early postoperative period. After the precipitous fall in weight induced in most patients by the operative procedure and the catabolic effects of the immediate postoperative period, a majority of the patients lost weight on a gradual and steady basis during the follow-up period. Patients followed from 3-6 months have lost from 54-75 pounds. Following surgery, there was a great increase in fecal fat with a concomitant drop in serum carotene and serum cholesterol levels. These patients lost more fat than lean tissue, particularly after 6 months when they recovered as far as potassium homeostasis was concerned.

6744 PEUTZ-JEGHERS SYNDROME: CLINICAL AND ROENTGENOGRAPHIC FEATURES. (E.)

Godard, J. E. (Med. Coll. Wisconsin, Milwaukee), W. J. Doods, J. C. Phillips and G. T. Scanlon. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):316-324, 1971.

Salient features of Peutz-Jeghers syndrome are presented based on experience with 9 patients. The mucocutaneous pigmentation in Peutz-Jeghers syndrome, inherited as an autosomal dominant, is invariably flat, nonhairy and nonpruritic. Affected individuals usually present with gastrointestinal symptoms related to intussusception, the most frequent presenting symptom being abdominal pain. The occurrence of nausea, vomiting and abdominal distention indicates persistent intussusception accompanied by intestinal obstruction. Rectal bleeding and frank melena occur in 30% of patients. The small bowel is involved in more than 95% of patients and the polyps are generally multiple. Peutz-Jeghers polyps, generally regarded as benign nonproliferating hamartomas, may be either sessile or pedunculated, and range in diameter from 0.1 to 3.0 cm. Abnormal plain film roentgenographic findings, when present, are caused by small bowel intussusception and obstruction. Demonstration of gastrointestinal polyps requires an examination using barium. The features of Peutz-Jeghers syndrome show little or no overlap with those of other hereditary gastrointestinal polyposis syndromes, such as familial-multiple polyposis or Gardner's syndrome.

6745 INTRALUMINAL pH OF DUODENUM AND JEJUNUM IN FASTING SUBJECTS WITH NORMAL AND ABNORMAL GASTRIC OR PANCREATIC FUNCTION. (E.) Benn, A. (Gen. Hosp., Birmingham, England) and W. T. Cooke. *Scand. J. Gastroenterol.* 6(4): 313-317, 1971.

A Cambridge combined glass electrode was used in normal subjects and in patients with gastrointestinal diseases to measure the intraluminal pH values in the duodenum and jejunum, and compared with those of aspirates from these regions. The variability of pH was less in the in situ samples than in the aspirates. In normals, the pH in the second to fourth parts of the duodenum (5 subjects) ranged from pH 5.8 to 7.0, while that in the duodenum (9 subjects) was pH 5.8 to 7.2. In 11 patients with achlorhydria (8 with proven pernicious anemia and 3 with intrinsic factor deficiency and steatorrhea) the pH ranged from 6.4 to 7.0. In normal duodenum, the pH by electrode measurement was always significantly greater than that of aspirates, while it was significantly lower for gastric measurements and not significantly different for jejunal measurements. Normal tracings were seen in 6 with duodenal ulcers and normal pancreatic function, but with basal acid secretion of 5-10 mEq/hr. In 4 patients with basal secretion of more than 15 mEq/hr, the pH tracing at the duodeno-jejunal junction showed frequent and sustained deflections at an acid pH for 7-10 min before returning to normal. Periods of sustained deflection comparable to those in gastric hypersecretors were seen in 2 patients with pancreatic achylia and in 4 of 5 untreated patients with celiac disease but not in any of 7 on a gluten-free diet.

6746 REGIONAL ENTERITIS IN EARLY INFANCY. (E.) Miller, R. C. (U. Mississippi Med. Ctr., Jackson) and E. Larsen. *Am. J. Dis. Child.* 122(4):301-311, 1971.

Six infants, seen within an 18-month period were described, in whom the symptoms of regional enteritis were observed within the first 5 months of life. Each of these infants developed progressive small bowel obstruction that required laparotomy. Four of the infants had an insidious onset, over a period of days or weeks, of intermittent and progressive abdominal distention, uncontrolled diarrhea, and weight loss. Two infants had the rather abrupt onset over the span of a few days of distention and intestinal obstruction without diarrhea. Their disease grossly and histologically conformed to the descriptive term regional enteritis: an acute and chronic, segmental, transmural inflammation of the distal small intestine and colon was of unknown etiology. Management of the infant with regional enteritis was divided into 3 phases: differential diagnosis and control of diarrhea, surgical management of complications and adjunctive treatment of the enteritis. Steroids or nonabsorbable intestinal antibiotics did not appear to be of definite benefit. High calorie transvenous right atrial feeding may be useful.

6747 A STUDY OF NORMAL AND ISCHAEMIC JEJUNAL MUCOSA BY SCAN ELECTRON MICROSCOPY. (E.) Rao, S. N. and A. W. Williams. *Proc. Univ. Otago Med. Sch.* 49(1):21-22, 1971.

6748 HEMORRHAGE FROM A POLYPOID LIPOMA OF DUODENUM. (E.) Lemer, J. (St. Charles Hosp., London). *Proc. R. Soc. Med.* 64(4):395, 1971.

6749 RUPTURE OF AN ANEURYSM OF THE ABDOMINAL AORTA INTO THE DUODENUM. (Ger.) Raithel, D. (U. Erlangen-Nuremberg Surg. Clin. Germany). *Munch. Med. Wochenschr.* 113(14): 506-507, 1971.

6750 INTERPOSITION OF A JEJUNAL SEGMENT: CLINICAL ASPECTS. (Por.) De Araujo Teixeira, A. M. (Sch. Med., Porto, Portugal). *Medico (Porto)* 59(1026):369-387, 1971.

6751 BENIGN TUMORS OF THE SMALL INTESTINE. (Rus.) Antonovich, V. B., T. A. Tretiakova and V. I. Iakushin. *Vestn. Rentgenol. Radiol.* 46(3):29-34, 1971.

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6795 NEOPLASMS OF THE SMALL INTESTINE. (E.) Cohen, A., D. McNeill, J. J. Terz and W. Lawrence, Jr. (Med. Coll. Virginia, Richmond). *Am. J. Dig. Dis.* 16(9):816-824, 1971.

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See also numbers: 6308, 6309, 6523, 6925

REGIONAL ENTERITIS

6798 RECURRENCE OF CROHN'S DISEASE AFTER PRIMARY EXCISIONAL SURGERY. (E.) De Dombal, F. T. (Gen. Infirm., Leeds, England), I. Burton and J. C. Goligher. *Gut* 12(7):519-527, 1971.

The overall recurrence rate associated with Crohn's disease, as examined in a series of 168 patients who had undergone primary resection for this condition from 1939-1968, was 34.2%. The age of the patient at operation was inversely related to the risk of recurrence. Patients with primary large intestine disease showed less liability to develop recurrence than patients with predominant small intestine involvement. Risk of recurrence was highest after small intestine resection and lowest after proctocolectomy, and was not related to the urgency of the operation. Most recurrences developed either during the first yr after surgery, or some 5-15 yr later. The commonest site of recurrence was in the ileum, usually just proximal to the anastomosis. Such a situation was present in 66% of the patients with recurrence. Patients with early recurrence had a shorter history of symptoms at operation, and a graver outlook than those with late recurrence. Even though patients with recurrence fared worse than those without recurrence, some 70% of the recurrent cases were in good or very good health. The risk of further recurrence after a second or third operation was no greater than after a first operation.

6799 TREATMENT OF CROHN'S DISEASE WITH B.C.G. CLINICAL AND RADIOLOGICAL STUDY. (Fr.) Geffroy, Y. (Charles Nicolle Hosp., Rouen, France), R. Colin, P. Hecketsweiler and M. Segrestin. *Arch. Fr. Mal. App. Dig.* 60(6-7):293-298, 1971.

Increasing doses of Bacillus Calmette-Guerin (BCG) were administered at intervals of 4 days to 1 week to 12 patients with clinical and radiological symptoms of Crohn's disease. Of these 12 patients, 5 (2 with ileitis and 3 with colitis) had not undergone surgery, and 7 surgically-treated patients had recurrences involving the small intestine (6) and the colon (1). Complications at the time of treatment included fistulas between the small intestine and skin (4 patients), a rectovaginal fistula (1 patient), and anal or perianal lesions (6 patients). Follow-ups made for 6 months to 2 yr showed that 3 patients were apparently cured, 7 had improved significantly, and 2 had improved somewhat, but required surgery. B.C.G. treatment has been discontinued for 6-18 months in 7 patients, none of whom showed any evidence of recurrence.

6800 TREATMENT OF CROHN'S DISEASE WITH B.C.G. BIOLOGICAL FINDINGS AND AN ATTEMPT TO INTERPRET THEM. (Fr.) Geffroy, Y. (Charles Nicolle Hosp., Rouen, France), R. Colin, P. Hecketsweiler and M. Segrestin. *Arch. Fr. Mal. App. Dig.* 60(6-7):299-308, 1971.

Administration of Bacillus Calmette-Guerin (BCG) to 12 patients with Crohn's disease significantly increased serum immunoglobulin G and A levels. This finding appears to confirm the adjuvant effect of BCG immunity in Crohn's disease, but the site of action was not established. The favorable effect of BCG therapy in Crohn's disease is attributed to its adjuvant effect.

6801 IN-VITRO INHIBITION OF LEUCOCYTE MIGRATION IN CROHN'S DISEASE BY A SARCOID SPLEEN SUSPENSION. (E.) Willoughby, J. M. T. (St. Bartholomew's Hosp., London) and D. N. Mitchell. *Br. Med. J.* 3(5767):155-157, 1971.

Subjects consisted of 18 patients with definite Crohn's disease (5 of whom were receiving corticosteroids), 4 with probable Crohn's disease (1 of whom was on steroids), 4 with clinically definite ulcerative colitis (2 of whom were receiving steroids), and 9 controls with a variety of medical pathology, none of whom was on steroids. The comparative migration indices of the peripheral WBC from each of the patients were measured in the presence of Chase-Stilzbach type 1 Kveim suspensions prepared from normal spleen, and from Chase-Stilzbach type 3 Kveim suspensions prepared from sarcoid spleens. A migration index of 0.8 or less with sarcoid spleen suspension was seen with cells from 66% of 18 patients with definite, and 75% of 4 patients with probable Crohn's disease. No such inhibition was seen with cells from the ulcerative colitis or control patients. None of the groups differed significantly from each other, using the normal spleen suspension. In the definite and probable Crohn's disease patients, the range of readings was significantly higher in those receiving steroids than in those not.

6802 TRANSMURAL DISEASE OF THE ALIMENTARY TRACT. (E.) Mathews, J. E. (Scott White Mem. Hosp., Temple, Tex.), R. F. Peterson, J. P. Eberts and R. R. White. *Ann. Surg.* 173(6): 966-970, 1971.

6803 THE CLINICAL FEATURES AND PATHOGENESIS OF SCLEROSING REGIONAL ILEITIS (CROHN'S DISEASE) IN CHILDREN. (Ger.) Joppich, G. (Univ. Pediatr. Clin., Gottingen, Germany). *Z. Kinderchir.* 10(1):48-53, 1971.

6804 CROHN'S DISEASE: A PITFALL IN GASTROENTEROLOGY. (Fr.) Maffioli, C. (CHU Dept. Med. Pathol., Reims, France), S. Segal and H. Geoffroy. *Maroc Med.* 51(543):130-136, 1971.

6805 CROHN'S DISEASE. (Rus.) Belonosov, V. P. and G. N. Kuznetsova. *Khirurgiia (Mosk.)* 47(3):85-91, 1971.

6806 CROHN'S DISEASE. (Fr.) Kohler, J. J. (CHU Gen. Surg. Serv., Strasbourg, France), C. Lecerf and L. F. Hollender. *J. Med. Strasbourg* 2(1):17-20, 1971.

6807 ACUTE REGIONAL ILEITIS DUE TO ANISAKIS LARVAE. (E.) Hayasaka, H. (Sapporo Med. Coll., Japan), H. Ishikura and T. Takayama. *Int. Surg.* 55(1):8-14, 1971.

6808 REGIONAL ILEITIS (CROHN'S DISEASE). (Fr.) Baulieux, J., P. Vuillard, J. Venouil and L. Fischer. *Cah. Med. Lyon* 47(11): 1067-1081. 1971.

6809 URETERO ILEAL FISTULA DUE TO CROHN'S DISEASE. (E.) Blumgart, L. H. (Roy. Infirm., Sheffield, England) and K. Thakur. *Br. J. Surg.* 58(6):469-470, 1971.

6810 ADENOCARCINOMA OCCURRING IN CROHN'S DISEASE OF THE SMALL INTESTINE. (E.) Papp, J. P. (U. Michigan Med. Ctr., Ann Arbor) and H. M. Pollard. *Am. J. Gastroenterol.* 56(2):149-156, 1971.

See also numbers: 6801, 6832, 6996

MALABSORPTION

6811 A STUDY OF THE RATIOS OF BILE SALT CONJUGATES OF GLYCINE TO TAURINE IN THE JEJUNUM AND ILEUM IN PATIENTS WITH TROPICAL SPRUE. (E.) Kapadia, C. R. (Christian Med. Coll. Hosp., Vellore, India), A. N. Radhakrishnan, V. I. Mathan and S. J. Baker. *Scand. J. Gastroenterol.* 6(4):357-361, 1971.

Subjects consisted of 6 controls and 8 patients with tropical sprue, all of whom were on a diet of 50 g fat/day. All controls had stool fat excretion less than 5 g/24 hr, normal D-xylose and vitamin B_{12} absorption tests, normal jejunal biopsies and a normal upper gastrointestinal series. All patients with tropical sprue had steatorrhea (10-32 g/24 hr), D-xylose malabsorptio abnormal jejunal biopsies and 5 of the 8 had vitamin B_{12} malabsorption. The mean ratio of glycine to taurine conjugates of di- and trihydroxy bile salts in the upper jejunum was significantly greater in those with tropical sprue (6.2) than in controls (2.1); in the lower jejunum the values were 6.9 and 2.0, resp.; in the upper ileum, 3.6 and 1.7, resp. In 2 sprue patients in remission, the jejunal values were normal.

6812 THE RESPONSE OF INFANTS TO CARBOHYDRATE ORAL LOADS AFTER RECOVERY FROM DIARRHEA. (E.) Lifshitz, F. (U. Maryland Hosp., Baltimore), P. Coello-Ramirez and M. L. Contreras-Guitierrez. *J. Pediatr.* 79(4):612-617, 1971.

The effect of oral loads of carbohydrate on blood reducing sugars and on stool patterns was studied in 46 infants recently recovered from diarrhea. During the first week after recovery from diarrhea, 7 of 8 lactose-tolerant patients had no stool changes detectable after the disaccharide oral load but 35 of the 38 lactose-intolerant patients developed diarrhea with acid stools and carbohydrates in the feces. The responses to sucrose tolerance tests were also related to the capacity to tolerate carbohydrates during the acute stage of the illness. Normal responses to maltose and glucose were observed. Patients who did not have any changes in the stool pattern during the 24 hr following an oral lactose load had a mean increment in blood reducing sugars of more than 40 mg%, whereas a diminished rise occurred in the infants who developed diarrhea. The time when the maximum elevation in blood sugar occurred after lactose oral loads was correlated with the development of diarrhea. Those patients who had a delayed type of blood sugar curve were those who had diarrhea, acid stools and excretion of carbohydrates in 14 of 16 cases.

6813 VITAMIN E-DEPENDENT ANEMIA IN THE PREMATURE INFANT. II. RELATIONSHIPS BETWEEN GESTATIONAL AGE AND ABSORPTION OF VITAMIN E. Melhorn, D. K. (Babies Child. Hosp., Cleveland, Ohio) and S. Gross. *J. Pediatr.* 79(4):581-588, 1971.

The relationships between intestinal absorption of vitamin E and gestational age were studied in 186 premature infants. Ability to transport vitamin E across the intestinal mucosa was directly related to the gestational age of the premature infant during the first 3 postpartum months. Even with vitamin E supplementation, the youngest premature infants could not achieve vitamin E sufficiency. Vitamin E absorption in the small intestine improved as the chronologic equivalent of a full-term gestational age was approached in neonates delivered before 32 weeks of gestation. In infants with a birth weight of less than 1500 g, oral administration of vitamin E (25-100 U) failed to raise serum vitamin E levels above 0.50 mg% until 10-12 weeks of age. In contrast, infants with birth weights of 2001 - 2400 g not supplemented with vitamin E had serum vitamin E levels above 0.50 mg% after the second week of life. When ferrous sulfate was combined with orally administered vitamin E preparations, there was a decrease in vitamin absorption 4, 6 and 8 hr after administration indicating a possible interference by iron of the intestinal absorption and/or utilization of vitamin E.

6814 THE DUODENUM IN CELIAC SPRUE. (E.) Nicolette, C. C. (U. Minnesota Hosp., Minneapolis) and T. E. Tully. *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 113(2):248-254, 1971.

Roentgenographic changes in the duodenum of 30 patients with celiac sprue were reviewed for diagnostic verification of the disease. Duodenal abnormalities consisting mostly of thickened mucosal folds associated with decreased number and asymetric distribution were observed in 25 of 30 cases of celiac sprue. These changes were most often localized in the first and second portions of the duodenum with gradual transition to a normal fold pattern in the transverse portion. Six patients showed varying degrees of duodenal dilatation in association with the above findings and only 1 patient showed duodenal dilatation with normal mucosal folds. The remainder of the small bowel exhibited dilatation in 29 of 30 cases and in 3 cases jejunal and ileal mucosal thickening was evident. Segmentation and flocculation were very infrequent in these patients and was most often found in those patients studied with micropulverized barium. Celiac sprue produces distinct duodenal changes that are manifested roentgenographically which may aid in differentiating this disease from other diseases of the small intestine.

6815 LACTOSE ABSORPTION AND MUCOSAL DISACCHARIDASES IN CONVALESCENT PELLAGRA AND KWASHIORKOR CHILDREN. (E.) Prinsloo, J. G. (Natl. Inst. Nutr. Dis., Pretoria, South Africa), W. Wittmann, H. Kruger and E. Freier. *Arch. Dis. Child.* 46(248):474-478, 1971.

Reports of lactose intolerance among non-Caucasian people has led to caution in the use of milk in nutrition programs. Excessive caution against the use of milk may lead to worsening of infantile malnutrition in developing countries. It was shown that although there was lactose intolerance in pellagra and kwashiorkor patients, lactose deficiency was not necessarily synonymous with symptomatic lactose intolerance if the threshold was not exceeded. Serum albumin levels were lower than normal in pellagra, but severely depressed in kwashiorkor. Bantu children convalescing from kwashiorkor (10 patients) or pellagra (12 patients) were given oral lactose and glucose/galactose tolerance tests. Lactose absorption and intestinal disaccharidase levels were determined. In the pellagra group impairment of lactose absorption was greater and intestinal lactase levels were lower than in the kwashiorkor group. Absence of diarrhea with moderate quantities of dietary lactose in the presence of low intestinal lactase levels, but lactose malabsorption after loading is significant for nutrition programs in non-caucasian children. Diarrhea was less common in pellagra than in kwashiorkor because of early introduction of a mixed diet in pellagra, and a milk diet in kwashiorkor.

6816 THE XYLOSE EXCRETION TEST IN NORMAL CHILDREN AND IN PEDIATRIC PATIENTS WITH TROPICAL SPRUE. (E.) Santiago-Borrero, P. J. (Univ. Hosp., Caparra Heights, Puerto Rico), R. Santini, Jr. and N. Maldonado. *Pediatrics* 48(1):59-63, 1971.

In a group of 158 normal Puerto Rican school children (2.5 - 13 yr) given a 5 g dose of D-xylose p.o., the mean value for the 5-hr urinary xylose excretion test was 1.44 g (range 0.70 to 2.30 g). Seven excreted 0.9 g or less (18% of the administered dose) and this was also the upper limit of excretion by the patients with untreated tropical sprue. Of those who excreted less than 1.0 g, all but one were less than 6.5 yr old. In 30 children with proven untreated tropical sprue, the mean excretion was 0.54 g (0.20 - 0.90 g). In 17 with proven tropical sprue treated for 0.5 to 2.0 yr, the mean excretion was 1.48 g (1.00 - 2.30 g). The lowest value in this last group (1.00 g) was higher than the lowest 7 values in the control group.

6817 ABNORMALITIES IN INTESTINAL ELECTROLYTE TRANSPORT IN CONGENITAL CHLORIDORRHOEA. (E.) Turnberg, L. A. (Roy. Infirm., Manchester, England). *Gut* 12(7):544-551, 1971.

Direct measurements of electrolyte transport rates were made in the jejunum and ileum of a patient with congenital chloridorrhea using a triple-lumen tube perfusion technique. The low rate of contamination by fasting secretions entering the jejunal test segment (1-1.4 ml/min) segment from the more proximal bowel suggested an excessive secretion from stomach. Neither the pancreas nor the liver was causing the chloridorrhea. In contrast, water and electrolyte movement in the ileum was clearly abnormal. Compared to the normal ileum, which can absorb chloride until the luminal concentration is as low as 15 mEq/liter, chloride was secreted in this patient at a rate of 10.4 mEq/hr when the mean luminal concentration was 84.5 mEq/liter. There was not only a failure to absorb sodium and chloride against a concentration gradient but also evidence of secretion of sodium and chloride into the lumen, and absorption of bicarbonate in the absence of any concentration gradients for these ions. With absorption of bicarbonate from the plasma-like electrolyte solution, the perfusate became more acid as it passed down the ileal lumen, in contrast to the slight rise in pH in normals. In the stools, chloride concentration was greater than normal, bicarbonate less than normal while sodium and potassium concentrations were normal. A chloride/bicarbonate exchange acting in the direction of chloride secretion, that is, in the opposite direction to the normal anion exchange is probably the prime mechanism.

6818 LACTOSE INTOLERANCE FOLLOWING EXTENSIVE SMALL INTESTINAL RESECTION. (E.) Richards, A. J. (Kings Coll. Hosp., London), J. R. Condon and C. N. Mallinson. *Br. J. Surg.* 58(7):493-494, 1971.

The possibility of lactose intolerance contributing to diarrhea and steatorrhea following extensive small intestinal resection was studied in 4 patients. Three of the 4 patients had flat lactose-tolerance curves with normal glucose-galactose tolerance, and 1 patient developed abdominal cramps and diarrhea after lactose administration. A lactose-free diet for a period of 3 weeks was given to 1 patient, resulting in a decrease in the weight and bulk of the stools and a reduction in the fecal fat (estimated on a 5-day stool collection) from 42 g/24 hr to 29 g/24 hr. The number of bowel actions also fell from 16 per day on a diet restricted in fat but not in lactose to 9 per day on a lactose-free diet. Possible explanations to account for lactose intolerance following extensive small bowel resection are: rapid passage of intestinal contents along the gut, total intestinal lactase reduction or bacterial overgrowth in the small intestine. It may be necessary not only to restrict ingestion of fat but also to provide disaccharide-free diets for this group of patients.

6819 STUDIES IN THE ABSORPTION AND METABOLISM OF FOLIC ACID. II. HOMOCYSTINURIA. (E.) Butterworth, C. E., Jr., C. L. Krumdieck and C. M. Baugh. *Ala. J. Med. Sci.* 8(1):30-43, 1971.

A case of a 14-yr-old boy with homocystinuria who had megaloblastic anemia, clinical features of gluten-sensitive enteropathy, steatorrhea, and improvement in symptoms while on folic acid supplements and a gluten-free diet, was presented. The clinical features of a second, unrelated patient whose course was marked by severe thromboembolic complications was also presented. The pattern of excretion of urinary folic acid activity in an 11-yr-old child with severe mental retardation and 2 past episodes of frank megaloblastic anemia, following the administration of folic acid, suggested the presence of a labile methylfolate pool, with a high rate of turnover and excretion of methyltetrahydrofolate in the urine. Radioisotope data indicated fecal and urinary losses of 38.5% of the administered dose. Although the patient appeared to retain 61.5% of the 2-^{14}C-folate administered, the urine contained a large amount of nonradioactive folate, presumably displaced from tissue binding sites. Therefore, the net retention or positive balance was only 20.5%. Homocystinuria is apparently due to a genetically determined defect in the activity of enzyme cystathionine synthetase.

6820 A CASE OF INTESTINAL VILLOUS ATROPHY IN A 10-MONTH-OLD INFANT. (Pol.)

Musialowicz, J. (Silesian Med. Acad. Ist Pediatr. Clin., Zabrze, Poland), F. Sliwa and D. Pawelek Krombholz. *Pediatr. Pol.* 46(2):201-205, 1971.

6821 NEW CONCEPT ON THE PATHOGENESIS AND NUTRITIONAL THERAPY OF ENTERITIS IN INFANCY. (Ger.) Schreier, K. (City Pediatr. Clin., Nuremberg, Germany) and U. Porath. *Med. Ernahrung* 12(6):121-126, 1971.

6822 DIAGNOSIS AND TREATMENT OF COELIAC DISEASE IN CHILDHOOD. (E.) Townley, R. R. W. (Roy. Child. Hosp. Res. Found., Melbourne, Australia). *Med. J. Aust.* 1(13):696-698, 1971.

6823 THE CLINICAL PICTURE AND TREATMENT OF COW MILK ALLERGY. (Ger.) Osvath, P. (Univ. Pediatr. Clin., Szeged, Hungary) and V. Markus. *Monatsschr. Kinderheilkd.* 119(5):165-169, 1971.

6824 PROTEIN-LOSING ENTEROPATHY ASSOCIATED WITH ARSENIC POISONING. (E.) Kobayashi, A. (Natl. Child. Hosp., Tokyo) and Y. Ohbe. *Am. J. Dis. Child.* 121(6):515-517, 1971.

6825 CLINICAL STUDY OF THE CELIAC DISEASE IN ADULT PATIENTS: CLASSICAL FEATURES AND ATYPICAL FORMS. (Fr.) Thys, O. (St. Pierre U. Hosp., Brussels, Belgium) and P. Mainguet. *Acta Gastroenterol. Belg.* 34(6):472-483, 1971.

6826 TREATMENT OF DISEASES OF THE SMALL INTESTINE. (Ger.) Kasper, H. (Justus Liebig U., Giessen, Germany). *Therapiewoche* 21(16):1276-1278, 1971.

6827 TREATMENT OF DISTURBANCES OF FAT ABSORPTION IN INFANTS AND CHILDREN BY MEDIUM CHAIN TRIGLYCERIDES. (Ger.) Derbacher, D. (City Pediatr. Clin., Furth, Germany). *Med. Ernahrung* 12(4):75-79, 1971.

6828 MALABSORPTION IN SYSTEMIC LUPUS ERYTHEMATOSUS. (E.) Bazinet, P. (U. Pennsylvania Gen. Hosp., Philadelphia) and G. A. Marin. *Am. J. Dig. Dis.* 16(5):460-466, 1971.

6829 CHANGES IN PANETH CELLS IN SOME ENTEROPATHIES WITH MALABSORPTION. (It.) Canepa, M. (U. Genoa Inst. Pathol. Anat., Italy), D. Buffa and G. Marenco. *Pathologica* 62(907-908): 65-67, 1970.

6830 TISSUE ANTIBODIES IN DERMATITIS HERPETIFORMIS AND ADULT COELIAC DISEASE. (E.) Seah, P. P. (St. Mary's Hosp., London), L. Fry, A. V. Hoffbrand and E. J. Holborow. *Lancet* 1(7704):834-836, 1971.

6831 MALABSORPTION IN CONSTRICTIVE PERICARDITIS. (E.) Khattri, H. N., S. S. Mahapatra and A. K. Sehgal. *Bull. Postgrad. Inst. Med. Ed. Res. Chandigarh* 4(4):167-168, 1970.

See also numbers: 6536, 7150

6832 ELECTRON MICROSCOPY IN CROHN'S DISEASE. (E.) Aluwihare, A. P. R. (St. Marks Hosp., London). *Gut* 12(7):509-518, 1971.

Specimens taken at operation or by sigmoidoscopy from 16 patients with Crohn's disease of the colon were studied by electron microscopy and compared with light microscopic findings. A heavy infiltration of inflammatory cells was observed in the lamina propria, and near areas of ulceration; the basal parts of the epithelium lost their integrity. Most of the components of the lamina propria did not differ significantly from those in the normal colon. In the submucosa and muscle coats there was increased edema and intercellular fibrosis with patchy infiltration by inflammatory cells. Fourteen percent of the lymphocytes in the colon in Crohn's disease showed a prominent cartwheel-like structure in the nucleus which was identified as the nucleolus (vs. 4% in the normal colon). Other changes observed in Crohn's disease included: increased proximity of lymphocytes to macrophages and epithelioid cells, an increase in the metabolic activity of epithelioid cells and the appearance within epithelioid cells of vesicles containing acid phosphatase but little visible debris. Of 11 cases of Crohn's disease in which specimens were taken away from the ulcerated or diseased bowel, 6 showed clusters of bacteria in the deeper layers of the colon. Light microscopic examinations of these areas revealed no gross abnormality. A disordered immune state may exist in these patients, allowing for the entrance of relatively innocuous fecal bacteria into the wall of the colon which produces the picture of the disease.

6833 ROENTGEN FINDINGS IN INTESTINAL GANGLIONEUROMATOSIS. ITS ASSOCIATION WITH MEDULLARY THYROID CARCINOMA AND PHEOCHROMOCYTOMA. (E.) Anderson, T. E. (Yale U. Sch. Med., New Haven, Conn.), T. J. Spackman and S. S. Schwartz. *Radiology* 101(1):93-96, 1971.

A 15-yr-old boy who presented with chronic diarrhea, intestinal ganglioneuromatosis, mucosal neuromas, and medullary thyroid carcinoma is reported. Barium studies of the colon revealed an abnormal haustral pattern, thick, coarse mucosal folds on postevacuation films, and diverticula. Some of these radiologic changes seem to reflect a functional abnormality of the muscularis mucosa and outer muscle layers which also could contribute to the development of diverticula. Furthermore, intestinal ganglioneuromatosis may cause initial constipation followed by chronic diarrhea resulting from a manifestation of the medullary thyroid carcinoma.

6834 EPIDEMIOLOGY OF CANCER OF THE COLON AND RECTUM. (E.) Burkitt, D. P. (172 Tottenham Court Road, London). *Cancer* 28(1): 3-13, 1971.

African countries were compared with Western countries in an epidemiological study of cancer of the colon and rectum. Results showed cancer of the colon and rectum to be closely associated with other noninfectious diseases of the bowel (benign tumor, diverticular disease, and appendicitis) and hemorrhoids, in geographical distribution, historical rise in incidence and in individual patients. This indicates that these conditions may have a common or related etiology. There is a close relationship between bowel cancer and economic development, and the operative factors are probably alterations in dietary patterns. These diseases were more common in Western, highly developed communities existing on low residue diets. Dietary fiber affects intestinal transit time, and the bulk, consistency and bacterial flora of the feces. Carcinogens produced by the action of an abnormal bacterial flora when held for a prolonged period in a concentrated form in contact with the bowel mucosa may account for the high incidence of colonic and rectal cancer in economically developed countries.

6835 ISCHEMIC COLITIS WITH PERFORATION. (E.) Moss, A. A. (U. California Sch. Med., San Francisco) and A. R. Margulis. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2): 338-342, 1971.

Three patients with ischemic colitis and unsuspected colonic perforation are reviewed. Initial clinical findings were comparable with those reported in the literature; however, all 3 patients experienced repeated episodes of pain, diarrhea, and bleeding, which suggested continuation of acute disease. Clinical symptoms lasted from 3 weeks to 3 months without evidence of remission or rapid progression. Histologic evaluation of resected specimens demonstrated evidence of subacute and chronic ischemic colitis with colonic retroperitoneal perforation. Initial plain roentgenograms revealed evidence of a mass in the area of the perforation. No intramural or free peritoneal air was seen. None of the segments of perforated colon was dilated. A barium enema examination revealed a perforation with retroperitoneal extravasation of barium in all cases. The colon in the region of the perforation was edematous and ulcerated, and submucosal nodularities were evident.

6836 FAMILIAL POLYPOSIS OF THE COLON. A FOUR-DECADE FOLLOW-UP. (E.) Sachatello, C. R. (U. Kentucky Med. Sch., Lexington). *Cancer* 28(3):581-587, 1971.

A follow-up of a familial polyposis kindred first recognized in 1930 is reported. Five of 6 children with familial polyposis subsequently died of colorectal carcinoma at ages 20, 16, 18, 15 and 23. The clinical, pathologic, and genetic aspects of familial polyposis of the colon have become more sharply defined in recent years. It is transmitted as an autosomal dominant with a high degree of penetrance and variable age-dependent expressivity. The typical colon will be studied with numerous or even uncountable sessile or pedunculated (1.5 cm or less in size) polypoid lesions. Microscopically, mostly found to be adenomatous polyps, they usually antedate the development of colorectal cancer by 10-15 yr. The colorectal cancers which develop in familial polyposis are most common in the rectosigmoid region, similar to colorectal cancer in the general population. Duodenal lesions are the second most common malignancy in familial polyposis. Fibrous tissue overgrowth, especially when intramesenteric, may lead to morbidity and death. Extra-colonic lesions such as osteomas, desmoid tumor, epidermoid inclusion cysts and dental abnormalities are noted frequently. Two reasonable approaches to patients with familial polyposis of the colon are abdominal colectomy and ileoproctostomy, or proctocolectomy and permanent ileostomy.

6837 ROENTGENOLOGIC EXAMINATION IN THE DIAGNOSIS AND TREATMENT OF COLON VOLVULUS. (E.) Kerry, R. L. (St. Joseph Mercy Hosp., Ann Arbor, Mich.), F. Lee and H. K. Ransom. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(7):343-348, 1971.

The diagnosis of colon volvulus was made by roentgenologic examination in 72% of 100 cases having 123 episodes, with an almost equal incidence of cecal and sigmoid involvement. Flat, upright and decubitus roentgenograms were most useful in complete evaluation. Marked colon distention was suggestive of colon volvulus and the bird-beak or omega sign deformity was pathognomonic when present. The overall recurrence rate was 19%, while recurrence after conservative treatment was 62% and zero after operative treatment. The total mortality rate was 17%, with 10% found in the cecum, 33% in the transverse colon, and 21% in the sigmoid colon cases.

6838 THE ROENTGENOGRAPHIC DIAGNOSIS OF VILLOUS TUMORS OF THE COLON. (E.) Turek, R. E. (U. Nebraska Coll. Med., Omaha), W. C. Davis, W. J. Wilson and R. O. Olson, Jr. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2): 349-351, 1971.

Roentgenographic findings of 50 patients were evaluated to determine criteria for establishing whether villous tumors of the colon are benign or malignant. Of 50 barium enema examinations studied, 20 lesions ranging in size from 1.3 x 2 cm to 3.5 x 9 cm were demonstrated at sites that were later determined to be in the area of a resected villous tumor. Most of the lesions were either single, polypoid or filling defects. Of the 20 tumors detected, 10 were benign and 10 malignant. Three of 7 tumors 2 - 5 cm in diameter and 5 of 9 greater than 5 cm in diameter were malignant. In 30 cases with a resected lesion not detected on routine or air contrast barium enema studies, 15 polyps were less than 1 cm in diameter and 25 were less than 2 cm in diameter. No significant difference between the benign and malignant group was noted roentgenographically on the basis of size and shape alone. In addition, the presence or absence of lobulated surfaces, indented or well defined bases were not helpful in determining the malignancy of the tumors. The only valuable finding was the presence or absence of a pedicle, which was present in 5 of the benign cases and in only 2 of the malignant cases. Barium enema examination alone is seemingly not sufficient to determine the malignancy of villous tumors of the colon; however, a large sessile rigid lesion with a demonstrated ulcer seems to strongly suggest a malignant lesion.

6839 ULTRASTRUCTURE OF MYENTERIC PLEXUS IN LIPIDOSES OF CHILDREN: FURTHER APPROACH TO A SPECIFIC DIAGNOSIS BY RECTAL BIOPSY. (E.) Kamoshita, S. (U. Tokyo Dept. Pediatr.) and B. H. Landing. *Paediatr. Univ. Tokyo* (18): 69-78, 1971.

At autopsy, rectal tissue was obtained from children with lipidoses for electron microscopic examination of the myenteric plexus. In Tay-Sachs disease all neurons in the myenteric plexus contained membranous cytoplasmic bodies (MCB) identical to those in the CNS, but were fewer in number, and the nuclei were more irregular than those in cortical neurons. In Jansky-Bielshowsky disease, the neurons were small and some were compactly packed with irregular-shaped, moderately dense inclusions, and MCB-like structures were rare. In generalized gangliosidosis, some of the neurons were filled with MCB. In Niemann-Pick disease, the MCB were well-preserved and conspicuous, variable in size and their lamellar structures were simpler than those seen in Tay-Sachs disease. In Wolman's disease the neurons were characterized by multiple vacuoles, which were variable in size, most being empty, while some contained amorphous material. In Fabry's disease, most neurons contained abnormal cytosomes, mostly round myelin figures, but occasionally elongated bodies with a lamellar array similar to the zebra bodies described in the brain of Hurler's disease. In infantile neuraxonal dystrophy, the myenteric plexus contained numerous distended axons, which corresponded to the spheroid seen by light microscopy, containing an abundance of osmiophilic dense bodies; no abnormalities of synaptic endings or terminal axons were observed. In metachromatic leukodystrophy, the neurons and myenteric plexus were unremarkable; numerous mucosal histiocytes contained irregular myelin figures and dense bodies, as in the CNS.

6840 BOWEL HABIT IN PREGNANCY. (E.) Levy, N. (Rothschild Municipal Govt. Hosp., Haifa), E. Lemberg and M. Sharf. *Digestion* 4(4): 216-222, 1971.

Subjects consisted of 1,000 healthy postpartum Israeli women (689 multiparae, 311 primaparae) interviewed about their bowel habits before and during pregnancy, while controls consisted of 510 healthy nonpregnant women. The 1,000 subjects consisted of 50.2% Askenazi (Eastern European Jews), 12.7% Sephardi (Western European) Jews, 30.4% Oriental Jews and 6.7% Arabs. No change in bowel frequency was reported in 54.6%, while an increase in frequency was reported in 34.4% and a decrease in 11.0%. For the subgroups the results were: Ashkenazi, 52.6%, 35.4% and 12.0%, resp.; Sephardi, 47.3%, 44.9% and 7.8%, resp.; Orientals, 57.5%, 30.3% and 12.2%, resp.; Arabs, 70.0%, 25.3% and 4.6%, resp. Among the multiparae, of 499 whom reported similar bowel patterns in previous pregnancies, 289 had no change, while 117 had an increase and 93 a decrease, while 62 who reported a change from the previous pregnancies showed 18 with no change this time and 34 with an increase and 10 with a decrease.

6841 ARTERIAL LIGATION FOR CONTROL OF COLONIC DIVERTICULAR HEMORRHAGE. (E.) Gieske, J. C., P. C. Kahn and J. M. Moran (New England Med. Ctr. Hosps., Boston, Mass.). *JAMA* 217(8): 1100-1101, 1971.

A case of massive diverticular hemorrhage in a 77-yr-old poor-risk woman that was controlled by simple arterial ligation is presented. The artery which supplied the diverticulum was clearly demonstrated by emergency percutaneous selective superior mesenteric arteriography with 50 ml of iothalamate meglumine 60%. The arteriogram showed extravasation of the contrast medium from a branch of the right colic artery with pooling in the diverticulum in the right transverse colon. The ligation of the vessel effected immediate cessation of the bleeding. The diverticulum was inverted into the bowel lumen and closed from within a purse string suture. With the use of transillumination of i.v. administered fluorescein dye and UV light, an artery such as that described above (feeding artery) could possibly be identified and ligated after resorting to colostomy in the unprepared bowel.

6842 A COMPARISON OF 5 TECHNIQUES FOR THE DETECTION OF BLOOD IN FAECES. (E.) Woodman, D. D. (Coventry Warwickshire Hosp., Coventry, England). *Med. Lab. Technol.* 28(2): 121-123, 1971.

6843 COLOSTOMY IN RADIATION INDUCED RECTAL STRICTURE. (E.) Chaitin, H. (Whitestone Hosp., N. Y.). *Dis. Colon Rectum* 14(2):145-146, 1971.

6844 CARCINOMA OF THE COLON AND RECTUM. (E.) Anonymous. *Dis. Colon Rectum* 14(2):81-107, 1971.

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6849 PERFORATION OF THE COLOSTOMY LOOP - REPORT OF FOUR CASES. (E.) Chaimoff, C. (Beilinson Med. Ctr., Petah Tikva, Israel), S. Yadoo and M. Dintsman. *Am. J. Proctol.* 22(2): 115-119, 1971.

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6851 ENDOMETRIOSIS OF THE RECTUM AS AN INCIDENTAL FINDING DURING A GYNECOLOGI OPERATION - A CASE REPORT. (E.) Yadoo, S. (Beilinson Hosp., Petah Tikva, Israel), M. Dintsman and B. Eckerling. *Am. J. Proctol.* 22(2):126-128, 1971.

6852 THE SURGICAL TREATMENT OF RECTAL INCONTINENCE BY GRACILIS MUSCLE TRANSPLANT. (E.) Kaplan, I. (Beilinson Hosp., Petah Tikva, Israel) and H. Alfandary. *Am. J. Proctol* 22(2):102-104, 1971.

6853 FIBROMA OF RECTUM SIMULATING MALIGNANT TUMOR. CASE REPORT. (E.) Yadoo, S. (Beilinson Hosp. Petah Tikva, Israel) and P. Nathan. *Am. J. Proctol.* 22(2):105-107, 1971.

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6855 TUBERCULOSIS OF RECTUM AND SIGMOID COLON ASSOCIATED WITH UTERINE FIBROMA. (Fr.) Stroz, G. *Bull. Soc. Chir. Paris* 60(6): 405-410, 1970.

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6877 LARGE FECAL STONES - THE SIGMOID. (E.) Zbornik, R. C. (St. Joseph's Hosp., Lorain, Ohio). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):355-358, 1971.

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6879 DUPLICATION OF THE LARGE BOWEL. (E.) Kottra, J. J. (Stanford U. Sch. Med., Calif.) and W. J. Dodds. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):310-315, 1971.

6880 ROENTGENOGRAPHIC EXAMINATION OF PATIENTS WITH COLOSTOMIES, ENTEROSTOMIES, AND LARGE FISTULOUS AND SINUS TRACTS. (E.) Waldron, R. L., II (Columbia-Presbyterian Med. Ctr., New York, N. Y.) and W. B. Seaman. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):297-300, 1971.

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6887 SOME ASPECTS OF SURGICAL POLICY IN TREATMENT OF FISTULAS OF THE DESCENDING COLON. (Rus.) Amelina, O. P. *Vestn. Khir.* 106(3):45-47, 1971.

6888 CARCINOID TUMORS OF THE RECTUM IN CHILDREN: A REVIEW OF THE LITERATURE AND REPORT OF A CASE. (E.) Gold, M. S. (Montefiore Hosp., New York, N. Y.), P. R. Winslow and I. F. Litt. *Surgery* 69(3):394-396, 1971.

6889 PATHOGENESIS OF THE MUCOSAL FOLDS SURROUNDING PRIMARY CARCINOMAS OF THE RECTUM. (Fr.) Parturier Albot, M. (Coll. Med. Hosp., Paris) and G. Albot. *Sem. Hop. Paris* 47(8):485-493, 1971.

6890 MASSIVE BLEEDING OF THE RECTUM. (Hung.) Szilagyi, J. and L. Ritter. *Orv. Hetil.* 112(12):687-688, 1971.

6891 TOXIC MEGACOLON. (E.) Naqvi, M. A., D. Gaum and A. R. Gaum. *NS Med. Bull.* 50(1):13-15, 1971.

6892 ANAL PROLAPSE IN CHILDREN. (Dut.) Van Asperen De Boer, F. R. S. (Binnen Hosp., Amsterdam) and M. Schoorl. *Ned. Tijdschr. Geneeskd.* 115(19):828-831, 1971.

6893 THE TREATMENT OF ACUTE SIGMOIDITIS. (Fr.) Arnulf, G. *Lyon Chir.* 67(1): 65-66, 1971.

6894 AN ANALYSIS OF THE INCIDENCE OF CANCER OF THE RECTUM. (Rus.) Tikhonova, N. A. *Klin. Med. (Mosk.)* 49(3):35-38, 1971.

6895 THE PRACTITIONER FACED WITH A RECTAL HEMORRHAGE. (Fr.) Kohler, J. J. (Civil Hosp., Strasbourg, France) and L. F. Hollender. *J. Med. Strasbourg* 2(2):131-134, 1971.

6896 ANORECTAL ATRESIA WITH RECTOCLOACAL FISTULA. (E.) Bock, J. E. (Odense County City Hosp., Denmark) and C. M. Madsen. *Acta Chir. Scand.* 137(3):284-286, 1971.

6897 GARDNER'S SYNDROME. (Fr.) Hanson, D. J. (Rhode Island Hosp., Providence) and F. G. DeLuca. *Ann. Radiol.* 14(3-4):366, 1971.

6898 INTERPOSITION OF THE COLON BETWEEN THE LIVER AND DIAPHRAGM. (E.) Lenz, T. R. *Rocky Mt. Med. J.* 68(2):38-40, 1971.

6899 STENOSIS OF THE SIGMOID AND OF THE PSEUDOMEGACOLON. (Rus.) Arnaudov, G. V. *Khirurgiia (Mosk.)* 47(4):136-137, 1971.

6900 CLOTTING PROPERTIES OF THE BLOOD IN CHILDREN SUFFERING FROM ACUTE APPENDICITIS. (Rus.) Bezborodko, B. N., L. P. Shuliak and A. I. Chernovol. *Khirurgiia (Mosk.)* 47(4): 86-89, 1971.

6901 RECONSTRUCTIVE OPERATIONS IN CHILDREN OPERATED ON FOR FISTULAR FORMS OF ATRESIA OF THE ANUS. (Rus.) Sitkovskii, N. B. *Khirurgiia (Mosk.)* 47(4):81-84, 1971.

6902 INTRARECTAL PROCTOPLASTY IN CHILDREN. (Rus.) Leniushkin, A. I. *Khirurgiia (Mosk.)* 47(4):74-80, 1971.

6903 CARCINOID TUMORS OF THE RECTUM. (Fr.) Tuchmann, L., P. Cain and A. Aplogan. *J. Med. Strasbourg* 2(6-7):625-630, 1971.

6904 INTUSSUSCEPTION OF THE APPENDIX. (E.) Tao, H. (Montreal Child. Hosp., Quebec, Canada) and J. S. Dunbar. *J. Can. Assoc. Radiol.* 22(1):33-35, 1971.

6905 MANAGEMENT OF LARGE BOWEL OBSTRUCTION. (E.) Arminski, T. C. (Grace Hosp., Detroit, Mich.). *Grace Hosp. Bull.* 49(1):15-29, 1971.

6906 ACUTE CLINICAL PICTURES RELATED TO DIVERTICULAR DISEASE OF THE COLON. (Sp.) Mautone, D. and M. Salgado. *Cir. Uruguay* 40(6): 529-542, 1971.

6907 BARIUM INFILTRATION INTO THE RECTUM. ITS ANATOMICAL SITE. A COMPARISON OF CLINICAL AND EXPERIMENTAL RESULTS. (E.) Faivre, J., C. Balabaud, J. Bancons and J.-J. Dubarry. *Arch. Fr. Mal. App. Dig.* 60(6-7): 337-344, 1971.

6908 RADIOLOGIC DIAGNOSIS OF POLYPS AND SMALL TUMORS OF THE COLON. (Fr.) Mombet, J. and J. Soullard. *Rev. Prat. (Paris)* 21(15):2637-2665, 1971.

6909 THE ROLE OF A RADIOLOGIC METHOD IN THE DIAGNOSIS OF PRIMARY MULTIPLE CARCINOMA OF THE LARGE INTESTINE. (Rus.) Babina, N. M. *Vestn. Rentgenol. Radiol.* 46(3):34-39, 1971.

6910 LATERAL VIEWS IN RADIOGRAPHY OF THE RECTUM. (Fr.) Bloch, P., A. Merg, J. L. Grunenwald and R. Wolff. *J. Med. Strasbourg* 2(5):457-460, 1971.

6911 RECTAL CYTOLOGY BY AN IMPROVED REPLICA. (E.) Anselm, K., V. Lawoyin and J. Blonsky. *Henry Ford Hosp. Med. J.* 19(1):45-48, 1971.

6912 X-RAY DIAGNOSIS IN SURGICAL EMERGENCIES OF THE COLON. (Sp.) Curuchet, E. (Sch. Med., Montevideo, Uruguay). *Cir. Uruguay* 40(6):553-562, 1971.

6913 VARIABLE CONTRAST EXAMINATION OF THE COLON. (E.) Sinclair, D. J. (St. Joseph's Hosp., Victoria, British Columbia, Canada). *J. Can. Assoc. Radiol.* 22(1):36-39, 1971.

See also numbers: 6530, 6564, 6799, 6800, 7154, 7203

6914 ARGENTAFFIN CELLS IN ULCERATIVE COLITIS. (E.) Skinner, J. M. (Radcliffe Infirm., Oxford, England), R. Whitehead and J. Piris. *Gut* 12(8):636-638, 1971.

Quantitative studies were made on the argentaffin cells in the rectal epithelium of 68 patients with ulcerative colitis and 31 normal subjects and the counts related to length of history and severity of mucosal inflammation. Rectal biopsies were taken between 12-15 cm from the anal margin. The mean argentaffin cell count of the control group was 224/unit of epithelium, whereas in patients with ulcerative colitis, there were between 112-115 cells/unit of epithelium depending on the severity of inflammation. There were only slight differences in numbers of argentaffin cells with severity of inflammation and length of history. Argentaffin cells appeared at all crypt levels and in the surface epithelium in ulcerative colitis while in normal biopsies they appeared predominantly at the base of the crypts. The observed decrease in the argentaffin cell count may be the consequence of mucosal damage and the relatively low regenerative capacity of these cells.

6915 THE ROLE OF BILE SALTS IN DIARRHOEA OF PATIENTS WITH ULCERATIVE COLITIS. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.). *Gut* 12(8):632-635, 1971.

The fecal elimination of bile salts in patients with ulcerative colitis and the effect of cholestyramine treatment on clinical condition, fecal frequency, and fecal composition were studied to determine the role of bile salts in the diarrhea of these patients. None of the patients had steatorrhea. Fecal bile acid elimination was mostly normal and bore no significant relationship to the fecal mass or water, so that the watery diarrhea was not attributable to excessive amounts of bile salts. Cholestyramine therapy had no favorable effect on ulcerative colitis limited to the colon and not extended to the terminal ileum. Neither the average fecal mass, water, dry weight, nor fat were affected by cholestyramine in the ulcerative colitis patients, while the fecal mass in the controls was augmented due to excessive water output. Bile acid excretion and sterol balance values were markedly increased by cholestyramine in all patients but in contrast to controls showed an inverse relation to body weight. The fall in serum cholesterol was 39% in the patients and 27% in controls after cholestyramine treatment.

6916 IMMUNOLOGICAL STUDIES IN A PATIENT WITH ULCERATIVE COLITIS AND SARCOIDOSIS. (E.) Watson, D. W. (U. California Sch. Med., Davis), H. M. Friedman and A. Quigley. *Gut* 12(7):541-543, 1971.

The significance of the concurrence of ulcerative colitis and sarcoidosis is related to the abnormalities of lymphocyte function with which each has been associated. In sarcoidosis this functional abnormality is manifested by anergy for cutaneous cellular immune responses and hyporesponsiveness of lymphocytes to mitogenic stimulation. In ulcerative colitis and Crohn's disease, peripheral lymphocytes have been shown to be cytotoxic for allogenic colon epithelial cells. In this patient an autologous leukocyte skin test with a lymphocyte suspension revealed a positive response at 24 hr, exhibiting 2 cm of induration. These lymphocytes were also demonstrated to be cytotoxic for allogenic colon epithelial cells. The cytotoxic effect may have a basis other than cellular immunity.

6917 COURSE AND PROGNOSIS OF ULCERATIVE PROCTOSIGMOIDITIS. (E.) Farmer, R. G. (Cleveland Clin., Ohio) and C. H. Brown. *Am. J. Gastroenterol.* 56(3):227-234, 1971.

A study of 193 patients with ulcerative proctosigmoiditis (ulcerative colitis confined to the rectum and sigmoid flexure) seen from 1958-1966, revealed a more benign prognosis than ulcerative colitis involving the entire colon. A majority (108) had observed rectal bleeding for less than 6 months prior to diagnosis. For 34 patients, intermittent rectal bleeding had been present for more than 5 yr. Sigmoidoscopic features were indistinguishable from ulcerative colitis and could be differentiated from transmural colitis (Crohn's disease) in virtually all instances. Of 193 patients, the rectosigmoid was involved, at least 15 cm from the anal verge, in 105. Proctitis was limited to a more restricted area in 88 patients; X-rays of colon however were always normal. Perianal disease was not a typical finding in ulcerative proctosigmoiditis. Rectal bleeding was the predominant symptom, recurrences were common, systemic symptoms unusual and the response to topical steroid therapy satisfactory. When rare extension of the disease to involve the whole colon occurred (10%), it was usually within the first 2 yr after diagnosis. Ulcerative proctosigmoiditis is a benign variation of ulcerative colitis, with a good prognosis for 90% of patients affected.

6918 INFLAMMATORY BOWEL DISEASE. CYTOPHILIC ANTIBODY AND THE CYTOTOXICITY OF LYMPHOCYTES FOR COLONIC CELLS IN VITRO. (E.) Shorter, R. G. (Mayo Clin., Rochester, Minn.), K. A. Huizenga, R. J. Spencer, J. Aas and S. K. Guy. *Am. J. Dig. Dis.* 16(8):673-680, 1971.

Sera from patients with inflammatory bowel disease (IBD) such as chronic ulcerative colitis (CUC) or granulomatous colitis (GC) was shown to convey cytotoxicity for human colonic epithelial cells to normal peripheral blood lymphocytes. This property was due to the IgM fraction and the antibody was cytophilic. The property of IBD serum to induce cytotoxicity for colonic cells in normal peripheral blood lymphocytes appeared to be located in its IgM fraction. The cytotoxicity of lymphocytes for colonic cells was believed to involve an immune mechanism, the destruction of colonic cells being affected by release of lymphotoxic factor by the stimulated lymphocytes. Colonic bacteria may be significant in cytotoxicity development and in the pathogenesis of inflammatory bowel disease. Peripheral blood lymphocytes from patients with CUC or GC were treated with goat antihuman IgM serum. Their cytotoxicity for human colonic epithelial cells was inhibited, suggesting that a cytophilic antibody was acting.

6919 EXPERIENCES WITH IMMUNOSUPPRESSIVE THERAPY IN CHILDHOOD ULCERATIVE COLITIS. (E.) Schäefer, K.-H. (Univ. Pediatr. Clin., Hamburg-Eppendorf, Germany) and F. Bläker. *Z. Kinderheilkd.* 110(4):317-323, 1971.

Since 1966, 22 children with ulcerative colitis have been followed, 15 of whom had severe diseases and were selected for immunosuppressive therapy based on strictly defined criteria. Although all of these children showed severe disease, none required colectomy. Azathioprine was initially given at a dose of 5 mg/kg daily and followed with a maintenance dose of 3 mg/kg daily following remission. Difficulties were observed in only 2 cases. Of the remaining 13 cases, immunosuppressive therapy promptly resulted in complete clinical and rectoscopic remissions lasting from 1.5 months in the most recent case to 37 months in the patient with the longest follow-up. Roentgenologic findings of the colon were normalized in 2 cases and improved in 3 cases. Side effects were noted in 2 patients and consisted of cholestatic jaundice in a patient on a sub-therapeutic dosage level and vomiting in another patient. Alopecia and decreased linear growth were not observed under azathioprine treatment. Immunosuppressive therapy seems encouraging in the treatment of childhood ulcerative colitis.

6920 NON-SPECIFIC ULCERATIVE COLITIS IN CHINESE AND INDIANS IN SINGAPORE. (E.) Fung, W. P. (U. Singapore Dept. Clin. Med.), E. H. Monteiro, J. J. Murugasu, K. C. Ng, K. M. Kho and S. K. Lee. *Med. J. Aust.* 2(7):361-365, 1971.

In a 10-yr period, a hospital group in Singapore was presented with 5 Chinese and 5 Indian patients with nonspecific ulcerative colitis. The cases are reviewed only because of the rarity of this disease entity in these 2 groups and the extent to which the clinical presentation paralleled that in the West.

6921 CHRONIC ULCERATIVE DISEASE OF THE COLON. (E.) Montes, M. (State U. New York Dept. Pathol., Buffalo), E. Milch, L. Berman and G. J. Culver. *Dis. Colon Rectum* 14(2):117-122, 1971.

6922 HEMORRHAGIC PROCTOCOLITIS. (Fr.) Vuillard, P., J. Baulieux, L. Fischer and J. Venouil. *Cah. Med. Lyon* 47(13):1319-1334, 1971.

6923 CUTANEOUS MANIFESTATIONS PRESENTING PRODROMAL SYMPTOMS OF ULCERATIVE COLITIS. REPORT OF THREE CASES. (E.) Haim, S. (Rambam Govt. Hosp., Haifa, Israel), R. Friedman-Birnbaum and G. Alroy. *Am. J. Gastroenterol.* 56(2):157-161, 1971.

6924 CARRAGEENIN AND ULCERATIVE COLITIS. (E.) Sharratt, M. (British Indust. Biol. Res. Assoc., Surrey, England), P. Grasso, F. Carpanini and S. D. Gangolli. *Gastroenterology* 61(3):410-412, 1971.

6925 FUNCTIONS OF A PANCREATICODUODENAL ALLOGRAFT IN MAN. (E.) DiMagno, E. P. (Mayo Clin., Rochester, Minn.), J. Hermon-Taylor, V. L. Go, R. C. Lillehei and W. H. J. Summerskill. *Gastroenterology* 61(3):363-368, 1971.

Functions of a transplanted human pancreas and duodenum were studied in a 32-yr-old female juvenile diabetic with end-stage renal failure 3 months after operation. Basal outputs of amylase, lipase, trypsin and bicarbonate from the transplanted pancreas were normal. Outputs of lipase and amylase from the allograft were within the normal range by both exogenous (i.v. cholecystokinin-pancreozymin) and endogenous (intraduodenal amino acids) stimulation. High bicarbonate secretions in response to amino acid perfusion may be due to endogenous cholecystokinin-pancreozymin induced gastric acid secretion from the host stomach. Trypsin was not increased in response to the above stimuli, possibly due to local production of a trypsin inhibitor. Absorption of amino acids was grossly reduced in the duodenal allograft; glucose absorption was impaired and there was a slight reduction in basal electric rhythm. Endogenous secretion of cholecystokinin-pancreozymin from the transplanted duodenum was adequate and transmural potential difference was unimpaired. At autopsy, the pancreatic graft was apparently well tolerated whereas rejection, together with evidence of decreased function, affected both the duodenum and kidney.

6926 REPORT OF A CASE OF ANNULAR PANCREAS OF THE NEWBORN IN TWO CONSECUTIVE SIBLINGS. (E.) Montgomery, R. C. (Fargo Clin., N. Dak.), M. H. Poindexter, G. H. Hall and J. E. Leigh. *Pediatrics* 48(1):148-150, 1971.

Two cases are briefly reported of consecutive siblings born 14 months apart after uneventful pregnancies. Both began spitting on the second day of life and had normal meconium stools. Abdominal flat plate and upright roentgenograms on days 3-4 in each case showed a dilated stomach with no air in the gastrointestinal tract distal to this point. Laparotomies revealed annular pancreases entirely encircling the duodenum. They are alive and well at 4 yr and 3 yr after side-to-side duodenojejunostomy, resp.

6927 TISSUE ISOANTIGENS A,B AND H IN CARCINOMA OF THE PANCREAS. (E.) Davidsohn, I. (Chicago Med. Sch., Ill.), L. Y. Ni and R. Stejskal. *Cancer Res.* 31(9):1244-1250, 1971.

The effect of cancerous transformation in the pancreas on tissue isoantigens A, B, and H was investigated using Coombs' mixed cell agglutination reaction. This reaction was positive in 19 biopsies taken from tissue free of carcinoma. In 22 of 26 biopsies diagnosed histologically as carcinomas, the mixed cell agglutination reaction (demonstrates isoantigens A, B and H of the RBC of groups A, B and O) was negative. In 4 primary carcinomas, the Coombs' reaction was negative in some areas and positive in others, frequently in the same slide or even in the same field. The highly anaplastic small cell differed from the less anaplastic signet ring cell immunologically, in that the anaplastic small cells were negative in the Coombs' reaction while the signet ring cells gave positive reactions. Only mixed cell agglutination reaction negative anaplastic cells were present in the metastases. This technique may be useful in the early diagnosis and prognosis of carcinoma of the pancreas.

6928 NEW TECHNIQUE OF ONE-STAGE HETEROTOPIC PANCREATICODUODENAL AUTOTRANSPLANTATION IN DOGS. (E.) Uchida, H. (U. Minnesota Health Sci. Ctr., Minneapolis), J. O. Ruiz, P. L. Castelfranchi, L. S. Schultz and R. C. Lillehei. *Surgery* 70(4):604-608, 1971.

A new technique of 1-stage intra-abdominal pancreaticoduodenal autotransplantation which results in preserved dual pancreatic function is described in 15 mongrel dogs. Five of 15 dogs were alive 4-12 months after the operation, while 7 died of technical errors, 3 died of hemorrhagic pancreatitis with abscess formation and 1 died of intussusception and peritonitis. Technical failure resulted from duodenal anastomosi leakage, graft congestion and venous thrombosis. The early postoperative period was characterized by a marked leukocytosis, a transient high serum amylase level, and hypoglycemia in 2 of 6 dogs. Four animals whose amylase did not decline died of pancreatitis secondary to venous compression and clot formation or suppurative peritonitis. Malnutrition and exocrine hypofunction occurred initially, followed by recovery within 3 months while endocrine function was well preserved except during the immediate postoperative period. This technique allows postoperative evaluation and seems useful for long-term evaluation of heterotopic transplantation of the pancreas.

6929 ROLE OF PHYTOHEMAGGLUTININ IN THE SURVIVAL OF PANCREATIC ALLOTRANSPLANTS IN THE DOG. (E.) Cabasson, J. (St. Eloi Hosp., Montpellier, France), C. Solassol, B. Serrou, H. Michel, C. Gellis, T. Metche and C. Romieu. *Eur. Surg. Res.* 3(2):112-121, 1971.

An immunodepressive action of phytohemagglutinin (PHA) that would not impair defensive mechanisms of infection was investigated in 13 dogs surviving for more than 48 hr with substitutive allotransplantation of the duodeno-pancreas. The average survival time was 34.7 days and was longer than a group receiving azathioprine, corticoids and antilymphocyte globulin. Three cases (23%) of infection with pneumonia and peritonitis were found in the series of 13 dogs receiving azathioprine and PHA as compared to 10 cases (43%) of infection of 23 dogs receiving azathioprine, corticoids and antilymphocyte globulin (Control group). Good histocompatibility was found in 4 dogs with an average survival time of 62.2 days (as compared to 35.3 days in the control group) and 3 of them died following discontinuance of immuno-depressive or PHA treatment. Five dogs displayed average or intermediate histocompatibility with an average survival time of 28.6 days as compared to 13 days in the control series. Poor histocompatibility was observed in 4 dogs who survived an average of 14.6 days. The better results found with azathioprine and PHA after pancreatic allotransplantation in dogs may be due to the lower incidence of infection and specific immunodepressive action of PHA.

6930 ANGIOGRAPHY OF THE VESSELS OF THE PANCREAS. (Rus.) Savchenko, A. P., G. P. Filimonov and T. V. Privesentseva. *Vestn. Rentg. Radiol.* 46(1):50-57, 1971.

6931 PANCREATIC SCINTIGRAPHY. (Ger.) Martonffy, K. (Univ. Radiol. Clin., Budapest, Hungary), G. Lehoczky and T. Hernady. *Roentgenblatter* 24(3):136-141, 1971.

6932 INFLUENCE OF DRUGS AND DIET ON UPTAKE OF ^{75}Se-METHIONINE BY THE PANCREAS. (Ger.) Deininger, H. K. (City Hosp., Heilbronn, Germany). *Nucl. Med. (Stuttg.)* Suppl. 8:223-229, 1970.

6933 TREATMENT OF CANCER OF THE PANCREAS BY RADIOTHERAPY. (Ger.) Salis Samaden, R. (Radiotherap. Inst., Saltzburg, Austria). *Roentgenblatter* 24(5):255-257, 1971.

6934 SURGICAL GASTROINTESTINAL DISEASE IN PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (E.) Blue, S. K. (Bowman Gray Sch. Med., Winston Salem, N. C.) and L. Shaffner. *NC Med. J.* 32(5):169-184, 1971.

6935 CYSTADENOMA OF THE PANCREAS. DISCUSSION AND CASE REPORT. (E.) Scott-Young, M. (Rachel Forster Hosp., Sydney, Australia). *Med. J. Aust.* 1(9):468-470, 1971.

6936 CLOSED TRAUMA OF THE PANCREAS. (REPORT ON 2 CASES). (Fr.) Lamelin, J. C. (Cent. Hosp., Roubaix, France) and J. Devambez. *Lille Med.* 16(2):285-287, 1971.

6937 DIAGNOSIS AND SURGICAL TREATMENT OF PANCREATIC CYSTS. (Ger.) Bunte, H. (U. Erlangen Surg. Clin., Germany), E. Muhe and M. Gollwitzer. *Med. Monatsschr.* 25(4):152-159, 1971.

6938 PANCREATITIS ASSOCIATED WITH PANCREATIC CARCINOMA: A STUDY OF 26 CASES. (E.) Gambill, E. E. *Mayo Clin. Proc.* 46(3):174-177, 1971.

6939 MYOCARDIAL LESIONS IN CYSTIC FIBROSIS OF PANCREAS. (Fr.) Fridman Manduzio, A. (U. Liege Lab. Pathol. Anat., Belgium) and J. Haot. *Arch. Anat. Pathol. (Paris)* 19(2):147-151, 1971.

6940 THE SURGERY OF HETEROTOPIC PANCREATIC TISSUE. (Ger.) Kivelitz, H. (Univ. Surg. Clin. A, Dusseldorf, Germany) and U. Schacht. *Zentralbl. Chir.* 96(15):520-523, 1971.

6941 THE DISTAL PANCREATIC-JEJUNAL SHUNT. MANAGEMENT OF BLOCKAGE TO OUTFLOW IN PANCREATIC LITHIASIS. (Ger.) Grill, W. (Dist. Hosp., Starnberg/See, Germany), H. A. Lederhuber and H. G. Wolff. *Fortschr. Med.* 89(10):430-432, 1971.

6942 EXPERIMENTAL HETEROTOPIC DUODENO-PANCREATIC TRANSPLANTATION. (Ger.) Draznin, N. (Univ. Surg. Clin., Bonn, Germany), A. Blomer, H. Bittscheidt and E. Bucheler. *Bruns Beitr. Klin. Chir.* 218(5):469-475, 1971.

6943 CYSTADENOMA OF THE PANCREAS. A REPORT OF TWO CASES. (E.) Lewis, A. (Roy. Free Hosp., London) and J. Dormandy. *Br. J. Surg.* 58(6):420-422, 1971.

6944 LIFE TABLES FOR CYSTIC FIBROSIS. (E.) George, L. (Hosp. Sick Child., London) and A. P. Norman. *Arch. Dis. Child.* 46(246):139-143, 1971.

6945 LATE ILEUS IN MUCOVISCIDOSIS. (Fr.) Gerbeaux, J. (Trousseau Hosp., Paris), J. Tournier and J. Grunberg. *Ann. Pediatr.* 47(21):372-376, 1971.

6946 CONNECTIVE TISSUE TUMOR OF THE PANCREATIC REGION. (Fr.) Joyeux, R. and M. Averous. *Lyon Chir.* 67(3):232-234, 1971.

6947 EFFECT OF MEDIUM CHAIN TRIGLYCERIDE ON INTESTINAL ABSORPTION OF LONG CHAIN FATTY ACIDS IN CHILDREN WITH CYSTIC FIBROSIS FED A MIXED DIET. (It.) Ansanelli, V. (U. Naples Inst. Clin. Pediatr., Italy) and M. A. Capotorti. *Fracastoro* 63(3-4):637-641, 1970.

See also numbers: 6535, 6557, 6565, 6566, 7079

6948 GROWING ROLE OF EARLY SURGERY IN CHRONIC PANCREATITIS: A PRACTICAL CLINICAL APPROACH. (E.) Dixon, J. A. and E. Englert, Jr. (VA Hosp., Salt Lake City, Utah). *Gastroenterology* 61(3):375-381, 1971.

Patients with chronic pancreatitis of alcoholic, familial and idiopathic types ultimately have severe pain, diabetes, debility, addiction and psychiatric problems. Medical measures have been generally unsuccessful in treating this disorder. Accurate diagnosis and clear-cut demonstration that the patient has progressive chronic pancreatitis are 2 major considerations for early surgical intervention. During surgical exploration residual biliary tract disease may be found as indicated by a pathological gallbladder or common duct, stones, strictures, or fibrosis of the ampulla of Vater. Correction of this problem is usually successful. Pseudocysts of the pancreas may be drained at the time of operation. Additional surgical treatment allows procedures to be carried out such as sphincteroplasty and retrograde ductal dilatation, distal pancreatectomy, longitudinal pancreaticojejunostomy and near total or total pancreatectomy in those patients with disabling and far-advanced chronic pancreatitis. In the case of diagnostic proof, demonstrable progression or appearance of major symptoms, it seems that surgery used in the early phases of chronic pancreatitis should be carefully considered as a method of preventing or modifying the end stages of the disease process.

6949 HAEMORRHAGIC SHOCK IN EARLY ACUTE PANCREATITIS. A RARE BUT SIGNIFICANT EVENT. (E.) Karmody, A. M. (Aberdeen Roy. Infirm., Scotland) and J. M. D. Galloway. *Br. J. Surg.* 58(7):519-520, 1971.

Hypovolemic shock resulting from massive i.p. bleeding in a 68-yr-old man with acute pancreatitis is reported. The patient presented with epigastric pain, low systolic blood pressure, rapid pulse, and poor peripheral circulation. Blood studies revealed a serum amylase of 533 units. Upon laparotomy, a tremendous amount of fluid and clot were seen in the lesser sac. Bleeding had resulted from erosion of 3 posterior arcades of the left gastric artery which overlaid a focal area of fatty necrotic pancreas. Bleeding was controlled and blood volume was restored prior to closing the abdomen. The patient's postoperative convalescence was smooth and after 1 yr his general health was excellent. Laparotomy or paracentesis seems indicated in patients with acute pancreatitis accompanied by circulatory collapse, and only early laparotomy can prevent death where severe hemorrhage is present.

6950 GALLSTONE PANCREATITIS. EXPLORATION OF THE BILIARY SYSTEM IN PANCREATITIS OF UNDETERMINED ORIGIN. (E.) Pfefferman, R. (Hadassah Univ. Hosp., Jerusalem) and E. M. Luttwak. *Arch. Surg.* 103(4):484-486, 1971.

Four cases of pancreatitis with pathology in the biliary system are presented, in which all the accepted diagnostic measures were ineffective in elucidating the etiology of the disorder. The results of X-ray studies were normal. At exploration, the gallbladders and common bile ducts seemed to be normal, and even operative cholangiograms did not reveal stones. A common entrance of the biliary and pancreatic ducts was demonstrated in all 4 cases. On histological examination of the gallbladder, cholecystitis was found in all cases, with cholesterolosis in 1 and tiny stones in the other 3. Aspiration of bile through gauze dressing allowed the detection of the tiny stones. Following treatment of the biliary tract disease, the patients had no further attacks of pancreatitis during the follow-up of 12 to 30 months from the time of operation.

6951 IMMUNOHISTOCHEMICAL STUDY OF GLOMERULAR LESIONS IN ACUTE PANCREATITIS. (E.) Gupta, R. K. (St. Catharines Gen. Hosp., Ontario, Canada). *Arch. Pathol.* 92(4):267-272, 1971.

Kidneys were studied immunohistochemically in 15 cases of acute pancreatitis. Glomeruli showed histopathologic alterations in 12 of the 15 cases and changes included: diffuse to segmental thickening of capillary basement membrane, and enlarged glomeruli due to increased mesangial matrix with presence of Schiff-positive and argyrophilic material in those locations. In 6 of 12 cases, the tubules showed evidence of moderate vacuolar degeneration and focal areas of tubular necrosis. With immunofluorescence studies, glomeruli showed distinct localization of conjugates of IgG, rabbit antihuman fibrin and rabbit antihuman fibrinogen in 5 of the 8 cases. IgM, IgA or complement were never found. In the 5 cases, mesangial and basement membrane deposits of IgG were seen as coarsely diffuse to lumpy deposits lying in the mesangial matrix and in a diffuse manner both inside and outside the basement membrane. Localization of none of the conjugates was observed in relation to tubule lining cells or their basement membranes. The glomeruli may be the primary site of damage in some cases of acute pancreatitis, and the glomerular lesion probably simulates the changes as are seen in membranous glomerulopathy.

6952 PREGNANCY PANCREATITIS. (E.) Berk, J. E. (U. California Dept. Med., Irvine), B. H. Smith and M. M. Akrawi. *Am. J. Gastroenterol.* 56(3):216-226, 1971.

Four women with acute pancreatitis developing during pregnancy or within a week following delivery were presented, and pertinent features of pregnancy pancreatitis were summarized. All survived. Acute pancreatitis usually develops during the third trimester of pregnancy or in the early postpartum period. Possible causes for acute pancreatitis in pregnancy are much the same as those adduced for acute pancreatitis in nonpregnant patients. However, alcoholism is not a prominent causative factor in pregnant women, whereas biliary tract disease is a frequent concomitant disorder. Hyperlipidemia, increased abdominal pressure, thiazide diuretic administration, rarely hyperparathyroidism and particularly gallstone disease may be contributing factors in some instances. In diagnosis, serum amylase and lipase levels and urine amylase excretion should be done more often during pregnancy, especially when digestive symptoms and pain occur. Calcium levels, normally lowered in the pregnant women, do not carry the same diagnostic and prognostic significance. Culdocentesis may be of diagnostic value. Treatment is basically conservative, with termination of the pregnancy to be considered when response to medical measures is unsatisfactory.

6953 ACUTE PANCREATITIS. (E.) Banks, P. A. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 61(3):382-397, 1971.

The relevance of recent information derived from experimental pancreatitis and newer ideas in the recognition and treatment of pancreatitis are reviewed. Etiologic factors include biliary tract disease, alcoholic pancreatitis, duodenal reflux and duodenal obstruction, hyperparathyroidism, pancreatic stones, hereditary pancreatitis, hyperlipidemia and postoperative pancreatitis. The pathophysiology, including the role of proteolytic and lipolytic enzymes, diagnosis, differential diagnosis and clinical features of acute pancreatitis are reviewed. The metabolic consequences of acute pancreatitis include altered calcium metabolism, lipid metabolism and islet cell function. The effectiveness of various medical and surgical procedures employed in the treatment of acute pancreatitis are summarized.

6954 THE X-RAY DIAGNOSIS OF CHRONIC PANCREATITIS. (Rus.) Salman, M. M., V. M. Arablinskii, R. N. Gurvich and V. S. Ioffe. *Klin. Med. (Mosk.)* 49(5):105-108, 1971.

6955 SOME PROBLEMS IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. (Rus.) Porembskii, O. B., S. S. Rakhmaninov and E. L. Bronshtein. *Vestn. Khir.* 106(2):27-32, 1971.

6956 THE SERUM CONCENTRATION OF THE THIRD COMPONENT OF COMPLEMENT β_{1C}/β_{1A} IN LIVER DISEASE. (E.) Fox, R. A. (Roy. Free Hosp., London), F. J. Dudley and S. Sherlock. *Gut* 12(7):574-578, 1971.

The serum concentration of the third component of complement (C'3) was measured in 221 patients with various types of acute and chronic liver disease and 46 healthy controls. All of the 18 patients with massive necrosis of the liver had hypocomplementemia (mean C'3 level of 46 mg/100 ml, compared to a normal level of 170 mg/100 ml). There was no difference between the patients with a viral etiology and a drug etiology. The majority of the 150 patients with chronic liver disease had normal levels of serum C'3. There were no patients with low C'3 levels among those with chronic persistent hepatitis, primary biliary cirrhosis, primary liver cell cancer, or alcoholic liver disease. Six of the 53 with active chronic hepatitis, and 4 of the 35 with cryptogenic cirrhosis had hypocomplementemia. There was no correlation between the level of C'3 and other evidence of disturbed immunity. Three of the 6 patients with active chronic hepatitis were positive for hepatitis associated antigen, and negative for autoantibodies, all 3 showing features of hepatic decompensation with jaundice. The observed hypocomplementemia in these patients with liver disease may be due to decreased synthesis or increased consumption of C'3, or a combination of both.

6957 STUDIES WITH ^{35}S-LABELLED DL-PENICILLAMINE IN PATIENTS WITH WILSON'S DISEASE. (E.) Gibbs, K. (U. Cambridge Dept. Invest. Med., England) and J. M. Walshe. *Q. J. Med.* 40(158): 275-287, 1971.

In 6 patients with Wilson's disease, labeled ^{35}S DL-penicillamine appeared rapidly in the plasma after oral administration. The mean maximum concentration reached was 3.4% of the dose per liter of plasma at 1 hr and this was rapidly followed by the appearance of the label in the urine. Autoradiographic studies demonstrated that the ^{35}S remained in the penicillamine molecule and did not appear to take part in transfer to other amino acids. Penicillamine had a similar clearance from plasma as creatinine in the first few hr; it seemed that both D and L isomers were similarly handled by the kidney. Early, however, penicillamine became bound to serum albumin and hence was less readily able to pass through a semi-permeable membrane. This was followed by a rapid decline in the rate of excretion in the urine which was complete by 24 hr. During the first few hr after administration, penicillamine may be evenly distributed throughout the body fluid, accounting for its therapeutic efficacy as a copper chelator since it was able to reach the metal in the intracellular as well as the extracellular compartment. Two patients who had had toxic reactions to penicillamine did not appear to handle the drug differently from the other 4.

6958 ANATOMY OF THE HEPATIC LESION OF INFANTILE POLYCYSTIC DISEASE. (E.) Landing, B. H. (Child. Hosp., Los Angeles, Calif.) and T. R. Wells. *Paediatr. Univ. Tokyo* (18): 112-119, 1971.

Blocks of liver from a 2-week-old male infant with typical hepatic lesions of infantile polycystic disease were processed for serial section-reconstruction and graphic analysis procedures. Low-power photomicrographs showed that the cysts are enlarged Hering canals and interlobular ductules. These anatomic abnormalities appear to result not from obstruction of the biliary tree or from primary overproduction of bile ductules but, instead, from enlargement of the components of the anastomosing network of such ductules normally situated on the periphery of portal areas. Many similarities of this lesion with the renal lesion were observed: involvement of ducts in the range of branching generations 12-20 from the epithelial primordium; involvement of terminal branches of the duct system; involvement of the level of the duct system into which drain the functioning parenchymal units, the liver cell cords; involvement of all ductules of the appropriate type in a basic process of enlargement (hypertrophy with epithelial hyperplasia) of structures normally present.

6959 AUXILIARY LIVER ALLOTRANSPLANTATION IN DOGS. AN IMPROVED TECHNIC AND EFFECTIVENESS OF ANTIHISTAMINIC DRUGS IN PREVENTING OUTFLOW BLOCK. (E.) Dionigi, R. (U. Cincinnati Dept. Surg., Ohio), J. W. Alexander, J. L. Meakins and J. P. Fidler. *Eur. Surg. Res.* 3(2): 93-104, 1971.

Liver homografts were transplanted on the left side of the abdomen in 28 splenectomized mongrel dogs. The dogs with hepatic transplants were divided into 2 groups on the basis of whether or not the antihistamine, diphenhydramine hydrochloride, was in the perfusate. Of 11 animals receiving transplants without the antihistamic drug, 6 died of outflow block syndrome with dark-blue, congested, hemorrhagic livers. Two dogs developed intractable bleeding diathesis due to excessive fibrinolysis. Two other dogs died of intravascular clotting and acute allograft rejection. Of the 17 dogs perfused with the antihistamine, only 1 showed significant outflow block which was associated with prolonged ischemia. Additional infusion of the drug into the portal vein dramatically improved the blood flow. Four dogs died of thrombosis with hypercoagulability after 3-4 days, 3 died of rejection after 6, 7 and 10 days, resp. and 4 died of bronchopneumonia. Other deaths were due to bleeding, technical errors and intussusception. One dog sacrificed 107 days after the transplant showed an enlarged transplanted liver with some foci of lymphoid cells around vessels. The recipient's own liver had abnormal architecture, decreased hepatocellular mass and approximated portal triads and central veins. Arterial supply and isotope uptake were considerably better in the transplanted liver than in the host's liver. Antihistamines appear helpful in preventing outflow block syndrome associated with liver allotransplantation.

6960 FATAL FAMILIAL STEATOSIS OF THE LIVER AND KIDNEY IN TWO SIBLINGS. (E.) Räsänen, O. (U. Oulu Dept. Pathol., Finland), M. Korhonen, S. Similä, T. Autere and J. Hakosalo. *Z. Kinderheilkd.* 110(4):267-275, 1971.

Cases are briefly reported of 2 siblings, born 18 months apart to healthy 27-yr-old parents with a noncontributory family history. The first, who had developed normally, died at 19 months of age with atypical hepatitis, while the second died at 56 hr of apparent cerebral hemorrhage. At autopsy, both were found to have marked fatty degeneration of the hepatic parenchymal cells and of the renal tubular epithelial cells.

6961 VITAMIN DEFICITS IN SEVERE ALCOHOLIC FATTY LIVER OF MAN CALCULATED FROM MULTIPLE REFERENCE UNITS. (E.) Frank, O. (Coll. Med. Dent. New Jersey, Newark), A. Luisada-Opper, M. F. Sorrell, A. D. Thomson and H. Baker. *Exp. Mol. Pathol.* 15(2):191-197, 1971.

Hepatic levels of various vitamins were measured in biopsy and autopsy specimens from 69 patients with normal livers and 44 patients with hepatic fat accumulation. The vitamin patterns of fresh autopsy liver samples and the percutaneous liver biopsies were the same. In the severe fatty liver, the total fat was increased 340% while DNA-phosphorus and total nitrogen decreased 50% and 51%, resp., where fat deposition had occurred. Vitamin titers in order of decreasing magnitude in normal liver were nicotinate, pantothenate, vitamin B6, thiamine, N^5-methyltetrahydrofolates, other tetrahydrofolates, vitamin B_{12}, and biotin. Nicotinate titers in normal liver were about 340 times higher than biotin. The largest percentage of vitamin deviations occurred when total fat was used as a reference; the vitamin decreases based on DNA-phosphorus and total nitrogen was less when fat infiltrated the liver. Biotin was most depressed in livers with severe fat accumulation; the least depressed were the tetrahydrofolates. In the severe fatty liver, pantothenate was higher than nicotinate and other tetrahydrofolates were higher than N^5-methyltetrahydrofolates. Total liver fat compared favorably with total nitrogen and DNA-phosphorus as a reference base.

6962 CONGENITAL CYSTIC DISEASE OF THE LIVER AND BILIARY SYSTEM. (E.) Longmire, W. P., Jr. (UCLA Sch. Med., Los Angeles, Calif.), S. A. Mandiola and H. E. Gordon. *Ann. Surg.* 174(4):711-726, 1971.

Records of 58 patients with various types of cystic lesions related to the biliary system over a period of 15 yr were reviewed. Most of the cystic conditions (41) were either intrahepatic, primarily parenchymal, solitary cysts (9) with or without communications with biliary system, polycystic disease (23) or typical extrahepatic choledochal cysts (9). Cystic biliary malformation was classified in relation to the levels of the biliary tree affected. Apparently, at one stage of embryological development, many more intralobular bile ducts are formed than are necessary. Failure of these ducts to involute and in the absence of proper distal duct connections, they may undergo gradual dilatation to form a polycystic liver. Solitary cysts of bile duct origin may arise by a similar mechanism. Multiple cysts of intrahepatic ducts may represent a malformation in the most distal portion of the ductal system formed from the duct anlage. Surgical treatment is generally designed to limit the size of the liver mass so as to avoid interference with adjacent organs and structures, and to maintain a normal nonseptic bile flow.

6963 HAEMOSTATIC INCISION OF THE LIVER: CARBON-DIOXIDE LASER COMPARED WITH SURGICAL DIATHERMY. (E.) Hall, R. R. (Roy. Coll. Surg. England, London). *Br. J. Surg.* 58(7): 538-540, 1971.

Using either the laser, diathermy, or a scalpel the anterior one-third of the left main lobes of 47 rat and 26 dog livers were excised. Blood loss per cm^2 of incised rat liver surface was smaller following laser resection than with the other methods. In dogs bleeding was profuse if the hepatic inflow circulation was not interrupted, and the laser was unable to prevent this hemorrhage. Total bleeding after scalpel and laser resection was very similar in dogs, and accounted for 40-50% of the total blood volume. On the other hand, when hepatic vessels were clamped during incision the total hemorrhage was reduced 40% by diathermy and 85% by laser compared with the scalpel control. Anticoagulation did not affect the results of diathermy incision, but the presence of the normal clotting mechanism made the superiority of laser incision even more marked. Cutting diathermy sealed vessels of up to about 0.5 mm diameter, while the laser closed vessels up to almost 2 mm. These vessels also resisted normal portal and hepatic arterial pressures when the clamps were released. The carbon dioxide laser could enable multiple, partial, lobar resections to be performed, which would permit a bolder approach to metastatic carcinoma, hydatid disease, or early multifocal hepatoma.

6964 THE EFFECT OF OBSTRUCTIVE JAUNDICE ON THE BLOOD VOLUME IN RATS. (E.) Gillett, D. J. (Austin Hosp., Heidelberg, Victoria, Australia). *J. Surg. Res.* 11(9):447-449, 1971.

Blood volume changes were measured in rats after ligation of the common bile duct to determine the effect of obstructive jaundice. Within 8 days after common duct ligation the mean blood volume was 4.57 ml/100 g as compared to 5.34 ml/100 g before obstruction. Control animals showed no change in blood volume during this period. The mean bilirubin concentration in control animals was less than 0.4 mg/100 ml while in animals whose common bile duct had been ligated 8 days previously, mean bilirubin levels were 9.4 mg/100 ml. No significant differences were observed in the mean weight changes of the two groups during the experiment. Normal blood volume should be restored in patients undergoing this procedure at the time of operation, and should be considered in their postoperative management.

6965 PORTAL HYPERTENSION IN A PATIENT WITH OSTEOPETROSIS. A CASE REPORT WITH DISCUSSION OF THE MECHANISM OF PORTAL HYPERTENSION. (E.) Denison, E. K. (550 Washington St., San Diego, Calif.), R. L. Peters and T. B. Reynolds. *Arch. Intern. Med.* 128(2):279-283, 1971.

A single case is reported of a 56-yr-old white female followed for 20 yr. Stigmata of osteopetrosis consisted of: hepatosplenomegaly, severe anemia, deafness, blindness, characteristic X-ray changes, maxillary osteomyelitis and a long history of pathological fractures. Her portal hypertension was clinically manifested by a dilated epigastric vein and the Cruveilhier-Baumgarten murmur and thrill. Liver biopsy and studies of portal hemodynamics excluded other causes of portal hypertension. This hypertension is thought to be due to increased extramedullary hematopoiesis with a consequent increase in splenic blood flow and in intrahepatic vascular resistance.

6966 SUGGESTED PATHOBIOCHEMICAL DEVELOPMENT OF CHRONIC HEPATIC PORPHYRIAS. (E.) Doss, M. (Univ. Inst. Hyg., Marburg a.d. Lahn, Germany). *Klin. Wochenschr.* 49(16):941-942, 1971.

A hypothetical sequence for the development of biochemically distinct stages in chronic hepatic porphyriasis (CHP) is presented. It is proposed that a liver lesion can produce secondarily elevated excretion of coproporphyrin (COPRO) as well as CHP type A. Increased excretion of uroporphyrin (URO) leads to either coprouroporphyrinuria or to CHP type B (from type A), which can also develop from secondary coprouroporphyrinuria after inversion of the COPRO/URO ratio with concomitant increase of hepatocarboxylic porphyrin (HEPTA). This inversion, together with a considerable elevation of excretion of URO and HEPTA, must occur whenever coproporphyrinuria or coprouroporphyrinuria progresses into CHP type C. Porphyria cutanea tarda always develops from asymptomatic type C as the absolute amounts of URO and HEPTA in the urine increase. Thus, a stepwise progression from the secondary porphyrinurias through the asymptomatic CHPs to porphyria cutanea tarda seems to exist. A diagram of the progression is included.

6967 LIVER SCANS IN CHRONIC GRANULOMATOUS DISEASE OF CHILDHOOD. (E.) Samuels, L. D. (Child. Hosp., Columbus, Ohio). *Pediatrics* 48(1):41-50, 1971.

The 5 subjects briefly reported consisted of 2 Caucasian cousins with predominate hepatic involvement, a Caucasian boy with diffuse hepatic involvement with lymphoma and 2 Negro sisters with hepatic and systemic involvement. Liver scans were prepared after preparation of the patient with either ^{131}I-Rose Bengal or ^{99m}Tc sulfur colloid. Serial scans were performed at intervals of 3-10 days, permitting assessment of resolution or progression of abscesses during and after a course of appropriate therapy. Such scanning permits visualization of both bacterial abscesses and the sterile granulomas which characteristically involve the liver, although it may not be possible to differentiate these processes from diffuse or miliary hepatic disease of other etiologies. This technique also permits more precise localization of abscesses from anterior, posterior and lateral aspects to facilitate closed surgical drainage.

6968 INTRAHEPATIC BILIARY ATRESIA ASSOCIATE WITH THE PRESENCE OF AUSTRALIA-ANTIGEN (E.) Ferrante, L. (U. Padua Pediatr. Clin., Italy) and F. F. Rubaltelli. *Paediatr. Paedol.* 6(3):225-229, 1971.

A term baby was born 35 days after his father manifested viral hepatitis. At 15 days of age, the child was noted to be jaundiced with acholic stools. During the ensuing period he had elevated transaminases, hyperbilirubinemia, hypercholesterolemia, an increased serum IgM level and plasma positive for hepatitis-associat antigen. A scan with ^{131}I labeled Rose Bengal was suggestive of intrahepatic biliary atresia. A laparotomy was performed at 5 months of age. Operative cholangiography revealed patency of both the right and left extrahepatic ducts, but both were significantly reduced in diameter. Open liver biopsy revealed absence of intrahepat biliary ducts in the portal spaces.

6969 CIRCUITRY AND TECHNIQUE OF EXTRA-CORPOREAL PORCINE LIVER PERFUSION FOR THE TREATMENT OF HEPATIC COMA. (E.) Chalstrey, L. J. and S. P. Parbhoo (Roy. Free Hosp., London *Br. J. Surg.* 58(7):522-524, 1971.

Treatment of 3 patients in acute liver failure by perfusing their blood through an isolated pig liver is described. The apparatus is equipped with a disposable oxygenator and allows monitoring of liver function by observation of blood flow, pressure, temperature, bile output, pH, PCO_2 and PO_2 of the extracorporal perfusate. All 3 patients were comatose due to acute liver failure resulting from infectious hepatitis, acute fatty liver of pregnancy or paracetamol-induced liver necrosis. All were unresponsive to painful stimuli. Levels of consciousness improved following perfusion of their blood through the pig liver in all 3 patients and 2 are now alive and well. This technique allows satisfactory function of the perfused liver independent of the patient's condition or output of blood from his arterial cannula, and seems to be successful in the treatment of comatose patients suffering from acute liver disease.

6970 ISCHEMIA POTENTIATING CRYOSURGERY OF PRIMATE LIVER. (E.) Neel, H. B. (NCI, Bethesda, Md.), A. S. Ketcham and W. G. Hammond. *Ann. Surg.* 174(2):309-318, 1971.

The pathophysiological consequences of multiple repetitive freezing and the effects of transient ischemia on the extent of cryonecrosis was studied in the liver of 13 rhesus monkeys. Uniform circular areas of frozen liver surface (iceballs) with diameters of 2-20 mm were produced after 2 min of freezing and in one case increased to 29 mm. after 5 min of freezing. The diameters of histologic cryolesions were similar to iceball diameters in animals treated without ischemia while the presence of ischemia, cryolesions were consistently 50% greater than iceball diameters. The diameter of the cryolesion (volume of cyronecrosis) was always greater in the group treated with ischemia, whereas iceballs did not vary in size in either ischemic or non-ischemic groups. Freezing doubled the cryonecrotic volume and was quadrupled by the addition of ischemia. SGPT and SGOT values were increased after cyrosurgery and then returned to normal. Histologically, 24 hr after a non-ischemic freeze, lesions showed homogeneous avascular coagulation necrosis, lightly stained nuclei, and loss of hepatocyte cellular detail. Following freezing during ischemia, bland peripheral lobular damage was found along portal tracts, adjacent to normal liver. All repetitive freezing enlarged the lesions and led to uniform cellular death. Little hemorrhage, inflammation or edema were found in the treated or adjacent areas. While resolution was usually complete within 60 days of cryosurgery, time for resolution was directly related to the magnitude of the cold insult. Cryosurgery coupled with ischemia safely destroyed significant portions of primate liver and may be effective in the eradication of rapidly enlarging tumors.

6971 THE NATURAL HISTORY OF PRIMARY CARCINOMA OF THE LIVER. (E.) Bengmark, S. (U. Lund Dept. Surg., Sweden), B. Börjesson and L. Hafström. *Scand. J. Gastroenterol.* 6(4): 351-355, 1971.

A retrospective study of 92 patients with primary hepatic carcinoma was made. Of 27 not subjected to laparotomy, 78% died within 1 month of diagnosis and the survival ranged from 0-3 months. Of 50 patients who underwent laparotomy, 11 were subjected to biliary shunt, portal shunt or cholecystectomy. Of these, 27% died within 1 month of surgery, while survival for the 11 ranged from 0-8 months (mean, 2.4 months). Of 39 subjected to laparotomy alone (25 with open hepatic biopsy), 66.7% died within 1 month and survival ranged from 0-4 months (mean, less than 1 month). Another 15 were subjected to hepatic resection (s), hepatic de-arterialization or chemotherapy by portal vein infusion. One male with cancer in both lobes of the liver is alive at 11 months after de-arterialization (14 months after diagnosis) and 3 are alive at 1, 2, and 10.5 yr after resection. Survival was not related to type of tumor, extent of tumor involvement, concomitant cirrhosis or elevation of serum alkaline phosphatase levels, but did correlate with serum bilirubin levels such that only 1 of 12 patients with a bilirubin level greater than 5 mg% survived more than 1 month.

6972 IATROGENIC LIVER INJURY RESULTING FROM DUCTAL INSTRUMENTATION WITH THE FOGARTY BILIARY BALLOON CATHETER. (E.) Eaton, S. B., Jr. (Letterman Gen. Hosp., San Francisco, Calif.), R. D. Wirtz, J. R. Ten Eyck and J. C. Richards. *Radiology* 100(3):581-584, 1971.

A characteristic form of hepatic injury was described as a complication observed in 3 patients who underwent biliary ductal exploration with the Fogarty balloon catheter. The complication consisted of irregular pseudoaneurysmal dilatation of hepatic biliary radicles and hepatic cavitation demonstrated by intra- or postoperative cholangiography. The complications described have not been clinically significant. Transient hemobilia and chemical evidence of modest hepatocellular injury have been the only objective abnormalities, other than the roentgen findings, detected in patients who have undergone this procedure. However, persistent or severe bleeding from the liver could conceivably occur and alternatively, the localized areas of hepatic cavitation formed might serve as a focus for abscess formation in patients with low grade pre-operative cholangitis.

6973 THE NATURAL HISTORY OF LIVER ALLO- AND AUTOTRANSPLANTATION IN THE PIG. (E.) Dent, D. M. (U. Cape Town Liver Res. Group, South Africa), R. Hickman, C. J. Uys, S. Saunders and J. Terblanche. *Br. J. Surg.* 58(6):406-413, 1971.

The complications of biliary drainage by cholecystoduodenostomy were compared with those in choledochocholedochostomy in 2 groups of pigs receiving orthotopic liver allografts (20) and autograft controls (20). Pigs undergoing liver allotransplantation demonstrated low-grade rejection of the allografted liver which was maximal during the second week and which subsided spontaneously without immunosuppression in 17 of 20 cases, while 3 showed more intense rejection and died within 1 week. The low-grade rejection was indicated by moderate round-cell infiltration seen on biopsies. Gastric ulcers occurred in 9 of the 10 allografts with a cholecystoduodenostomy for biliary drainage, and in 7 of 10 animals with a choledochocholedochostomy. Cholestasis occurred in 7 of 10 in the former group and 5 of 10 in the latter, and cholangitis occurred almost invariably in the first group but was absent in all but one of the second group. Among the autografts, gastric ulcer occurred in 8 with cholecystoduodenostomy, but in only 2 with choledochocholedochostomy. Biochemical abnormalities suggestive of rejection (increased SGOT, alkaline phosphatase, and bilirubin) could also be caused by cholestasis as a result of the biliary drainage method chosen.

6974 ANTI-SALMONELLA AGGLUTININS IN CHRONIC ACTIVE LIVER DISEASE. (E,) Protell, R. L. (Mayo Clin., Rochester, Minn.), R. D. Soloway, W. J. Martin, L. J. Schoenfield and W. H. J. Summerskill. *Lancet* 2(7720):330-332, 1971.

Anti-salmonella agglutinin titers were measured in 40 patients with chronic active liver disease, but with no evidence of salmonellosis. Of the 40 patients, 12 (30%) had strongly positive agglutinins with titers at 1/80 or greater. Cultures of blood (7 patients), feces (8 patients), and liver (5 patients) were done when titers were elevated, but all were negative. Positive agglutinations occurred to somatic antigens C, D or E, as well as to flagellar antigens to Salmonella paratyphi A and B and S. typhi. These raised titers probably indicate abnormal globulin formation, rather than salmonellosis. They did not correlate with treatment, age, sex, presence of cirrhosis, duration of disease, clinical course, SGOT, serum bilirubin, α-globulin, IgA, IgG, IgM, lupus erythematosis clot test, antinuclear antibody, or anti-smooth muscle antibody.

6975 LIVER FAILURE IN GALACTOSEMIA SUCCESSFULLY TREATED BY EXCHANGE BLOOD TRANSFUSION. (E.) Haworth, J. C. (Child. Hosp., Winnipeg, Manitoba, Canada) and F. J. Coodin. *Can. Med. Assoc. J.* 105(3):301 & 312, 1971.

An infant who had developed neonatal jaundice was admitted at 1 month of age when he was deeply jaundiced, mildly dehydrated, markedly distended with ascites and showed marked hepatomegaly and a body weight of 3.41 kg. Bilateral posterior cortical cataracts were present. He had previously fed well, vomited occasionally and had diarrhea. The urine contained bile, reducing substances 7.3% (later shown to be galactose), 75 mg protein/100 ml, and increased amino acids. Serum values were: bilirubin, 16.8 mg% total and 9.2 mg% direct; total blood sugar, 205 mg% with blood glucose of 40-65 mg%; total serum proteins of 3.7 g% (albumin/globulin of 2.6/1.1). He was hyponatremic (serum sodium of 104 mEq/liter) and had a metabolic acidosis. On admission blood showed no detectable galactose-1-phosphate uridyl transferase activity while the RBC galactose-1-phosphate level was 57 mg/100 ml of packed cells. He was rehydrated with i.v. glucose and electrolytes and a lactose-free diet but he worsened over the next 2 days, becoming unresponsive, oliguric and anemic, with increasing abdominal girth and pretibial and scrotal edema. He was placed on p.o. neomycin and systemic ampicillin and received an exchange transfusion of 700 ml of matched packed cells plus serum albumin; at that time 100 ml of bile-stained ascitic fluid was removed. He showed rapid improvement, becoming responsive, sucking and voiding frequently, and within 24 hr had lost 0.28 kg, and had a smaller liver. After 10 days he was without edema, ascites or jaundice and the liver was only 3-4 cm below the right costal margin. Discharged on the 19th hospital day, he progressed well on a lactose-free diet, and at 3 yr of age showed normal physical and mental development, although his cataracts had not regressed completely.

6976 CURRENT DATA ON DIFFERENTIAL DIAGNOSIS OF JAUNDICE. (Rum.) Bossy, D. (Dr. S. Stinca Hosp., Bucharest, Rumania). *Viata Med.* 18(6):273-276, 1971.

6977 THE DIAGNOSIS OF POSTOPERATIVE OBSTRUCTIVE JAUNDICE. (Ger.) Gresser, A. (Barmherzigen Bruder Hosp., Regensburg, Germany) and H. Everke. *Munch. Med. Wochenschr.* 113(14):515-518, 1971.

6978 TRANSUMBILICAL PORTOGRAPHY. THE VALUE OF SELECTIVE AND OCCLUSIVE INJECTION. (Fr.) Delvigne, J. (Univ. Liege Radiol. Serv., Belgium), N. Jacquet and A. Cops. *Ann. Radiol.* 14(5-6):373-393, 1971.

6979 THE CLINICAL VALUE OF TRANSUMBILICAL PORTOGRAPHY. (Fr.) Guffens, J. M. (U. Liege Dept. Clin. Pathol. Med., Belgium) and J. Pirard. *Ann. Radiol.* 14(5-6):395-408, 1971.

6980 THE DIAGNOSTIC VALUE OF SERUM β-GLUCURONIDASE. III. CHANGES OF SERUM β-GLUCURONIDASE ACTIVITY IN LIVER DISEASES AS COMPARED WITH THE RESULTS OF OTHER CLINICAL AND CHEMICAL INVESTIGATIONS. (Ger.) Nilius, R. (Martin Luther U., 1st Med. Clin., Halle-Wittenberg, Germany). *Z. Gesamte Inn. Med.* 26(12):384-393, 1971.

6981 SCANNING OF THE LIVER IN THE DIAGNOSIS OF CHRONIC HEPATITIS AND CIRRHOSIS. (Rus.) Loginov, A. S. and O. P. Petrova. *Med. Radiol. (Mosk.)* 16(6):10-15, 1971.

6982 MAGNETIC RECORDING SYSTEM FOR SIMPLIFICATION OF THE STUDY OF HEPATIC CIRCULATION USING COLLOIDAL ^{198}Au. (Por.) Lopes, J. F. (Francisco Gentil, Inst. Oncol., Losbon, Portugal) and A. M. Baptista. *Arq. Patol.* 42(1-2-3):55-60, 1970.

6983 SCINTIGRAPHY AND ARTERIOGRAPHY IN THE DIAGNOSIS OF DISEASES OF THE LIVER. (E.) Wang, I. (Gen. Hosp., Toronto, Ontario, Canada), D. E. Wood, R. F. Calapinto and B. Langer. *Can. Med. Assoc. J.* 104(11):989-993, 1971.

6984 BIOPSY OF LIVER DURING LIVER SCANNING WITH ^{198}Au (50 CASES). (It.) Abbati, A. (Maggiore Hosp., Bologna, Italy), R. Oppi and G. Curti. *Bull. Sci. Med.* 143(1):11-19, 1971.

6985 IMPORTANCE OF EARLY MEASUREMENT OF SULFOBROMOPHTHALEIN. (Sl.) Schwantzerova, M. (Inst. Postgrad Med., Bratislava, Czechoslovakia). *Lek. Obzor* 20(2):111-114, 1971.

6986 PARTIAL PURIFICATION BY AFFINITY CHROMATOGRAPHY OF TYROSINE AMINOTRANSFERASE SYNTHESIZING RIBOSOMES FROM HEPATOMA TISSUE CULTURE CELLS. (E.) Miller, J. V., Jr. (NCI, Bethesda, Md.), P. Cuatrecasas and E. B. Thompson. *Proc. Natl. Acad. Sci. USA* 68(5): 1014-1018, 1971.

6987 THE LIVER IN SECONDARY (EARLY) SYPHILIS. (E.) Sherlock, S. *N. Engl. J. Med.* 284(25):1437-1438, 1971.

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7035 THE EARLY CHANGES OF BLOOD FLOW IN ACUTE EXPERIMENTAL PANCREATITIS (INJECTION OF BILE INTO THE DUCT OF SANTORINI). (Fr.) Mallet Guy, P. (Hungarian Acad. Sci. Inst. Exp. Med., Budapest), M. Papp and C. Switalska. *Lyon Chir.* 67(1):21-23, 1971.

7036 POSTOPERATIVE PANCREATITIS. DIAGNOSIS AND TREATMENT. (Ger.) Wagner, E. (Lutheran Sisters Hosp., Giessen, Germany), M. E. Irfanoglu and K. Schultis. *Chirurg* 42(4):162-167, 1971.

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See also numbers: 6526, 6529, 6531, 6532, 6538, 6539, 6540, 6557, 6558, 6559, 6560, 6561, 6599

7038 EXPERIMENTAL PARACETAMOL-INDUCED HEPATIC NECROSIS: A HISTOPATHOLOGICAL STUDY. (E.) Dixon, M. F. (Sch. Med., Leeds, England), J. Nimmo and L. F. Prescott. *J. Pathol.* 103(4): 225-229, 1971.

The histopathology of paracetamol-induced liver necrosis was examined using 28 male Wistar rats killed at varying intervals following a single paracetamol (2.5-3.5 g/kg) injection. Rats dying within 24 hr following paracetamol administration showed chromatolysis (loss of basophilic granules) in the cytoplasm of centrolobular hepatocytes. Aqueous swelling was present as well as hydropic vacuolation and moderate congestion. Animals dying 24-48 hr after being given paracetamol showed marked congestion and frank hepatocyte necrosis ranging from small foci around the central veins to confluent bands involving centrilobular and midzonal cells as well as periportal hydropic vacuolation. Animals killed or dead after 3-5 days showed moderate to marked hepatic involvement with centrilobular zones filled with many plump, granular cells with identical nuclei which appeared as macrophage infiltration. Necrosis was reduced, hydropic change was rare, and many cells showed degenerative activity which consisted of mitotic figures, increased cytoplasmic basophilia, and hyperchromatic nuclei. Rats killed at 7, 14, 21 and 28 days showed relatively normal livers with decreased regenerative activity, complete preservation of the lobular architecture and no macrophage infiltration or fibrosis. Therefore, in the rat, cirrhosis is unlikely to result from a single large dose of paracetamol.

7039 POTENTIAL HEPATOTOXICITY OF COPPER IN RECURRENT HEMODIALYSIS. (E.) Bloomfield, J. (Child. Med. Res. Found., Camperdown, Australia), S. R. Dixon and D. A. McCredie. *Arch. Intern. Med.* 128(4):555-560, 1971.

The possibility that copper from relatively low dialysis-fluid copper concentrations derived from untreated tap water, may insidiously accumulate in the liver and eventually present clinically as hepatitis was investigated. With a dialysis fluid copper of 40 μg/100 ml, there was uptake by both plasma and RBC as shown by increased venous-return concentrations. In a unit with a dialysis-fluid copper concentration of 15 μg/100 ml, patients who had undergone kidney transplantation within 2 weeks previously demonstrated significant increases in their urine copper concentration range (mean 6.8 μg/100 ml), and 24 hr urine copper output (mean 145 μg/day). When dialysis was performed on dogs using fluid with 40 μg copper/100 ml or 100 μg/100 ml, the initial uptake of copper was principally by the plasma; however, the copper was concentrated in the RBC and in the liver.

7040 GASTROINTESTINAL DISORDERS IN CHRONIC ALCOHOLICS. (E.) Dinoso, V. P., Jr. (Temple U. Sch. Med., Philadelphia, Pa.), W. Y. Chey, D. Padow, A. Rosen, D. Ottenberg and S. H. Lorber. *Am. J. Gastroenterol.* 56(3):209-215, 1971.

Seventy chronic alcoholic patients were studied 4-8 weeks after admission to an alcoholic rehabilitation center. There was a high incidence of previous hematemesis and/or melena, peptic ulcer history and transient diarrhea following an alcoholic binge. No jaundice, splenomegaly or ascites were observed, although there was rare mild hepatomegaly. Fifty percent had either superficial or atrophic gastritis, 28% had varied degrees of fatty infiltration, 5% had mild cirrhosis without clinical evidence of portal hypertension and 4% had pancreatic exocrine insufficiency. Of the 3 with an abnormal cholescystokinin-pancreozymin test, one had a low volume and low bicarbonate concentration, while the other 2 had low amylase levels. The liver function tests which were abnormal most frequently were BSP, cephalin flocculation, and alkaline phosphatase tests which were elevated in 34, 21, and 10%, resp. The BSP test was the most commonly abnormal one in association with a fatty liver. Chronic pancreatitis resulting in pancreatic exocrine insufficiency is apparently infrequent in chronic alcoholics without cirrhosis

7041 CHRONIC ACTIVE AND LUPOID HEPATITIS CAUSED BY A LAXATIVE, OXYPHENISATIN. (E.) Reynolds, T. B. (U. Southern California Sch. Med., Los Angeles), R. L. Peters and S. Yamada. *N. Engl. J. Med.* 285(15):813-820, 1971.

Six, and possibly 7, patients with chronic constipation developed chronic active liver disease after 1-2 yr of daily ingestion of laxatives containing oxyphenisatin. Clinical parameters of hepatitis included fatigue, jaundic hepatomegaly and, in some, spenomegaly and spider angiomata. Laboratory abnormalities consisted of a 10-40-fold increase in transaminase activity, increase in serum globulins, and decrease in serum prothrombin and albumin. None had evidence of hepatitis-associated antigen, while positive results included lupus cell preparations in 2, antinuclear antibody in 2 and smooth-muscle antibody in 3. In liver biopsies there were areas of collapse and fibrosis with stromal lymphocytic infiltrate and focal areas of lysis of hepatocytes.

7042 BELOXAMIDE EFFECTS ON THE LIVER ULTRASTRUCTURE IN RATS. (E.) Khandekar, J. D. (U. Montreal Inst. Med. Exp. Surg., Quebec, Canada), B. D. Garg, and K. Kovacs. *Arch. Pathol.* 92(4):221-230, 1971.

Beloxamide [N-(benzyloxy)-N-(3-phenylpropyl) acetamide; 10 mg/day p.o. for 1-3 days], an antiatherosclerotic and hypolipemic agent, caused enlarged, pale yellow fatty livers in rats after 1 day. The number and size of lipid droplets increased in rats given beloxamide; this effect was most striking after 3 days. Several very large lipid droplets displaced the nucleus, and there were several membrane-bound osmiophilic spherules (liposomes). The rough-surfaced endoplasmic reticulum showed evidence of dilatation, disorganization, ballooning, and degranulation; the smooth-endoplasmic reticulum was scarcely recognizable. After 3 days of treatment, liver mitochondria were swollen, the number of cristae decreased, polymorphism was noticeable, and limiting membranes were irregular. After 3 days partial vacuolization of saccules of the Golgi apparatus was superceded by marked dilatation and disappearance of translucent, electron-dense particles. Lysosomes and microbodies increased while the glycogen content decreased. Hepatic lesions regressed 4 days after treatment was discontinued. During beloxamide treatment blood glucose and serum triglyceride levels decreased while the liver triglyceride content increased. Administration of methionine, glucose, and adenine sulfate did not prevent development of the hepatic lesions caused by beloxamide. It is suggested that a defect in the hepatocellular synthesis or release of lipoproteins or both may be responsible for lipid accumulation in rats treated with beloxamide.

7043 HEPATOTOXICITY OF DIMETHYLNITROSAMINE IN THE RAT WITH SPECIAL REFERENCE TO VENO-OCCLUSIVE DISEASE. (E.) Butler, W. H. (Med. Res. Council Labs., Carshalton, Surrey, England) and G. C. Hard. *Exp. Mol. Pathol.* 15(2):209-219, 1971.

The survival rates for rats receiving 30mg dimethylnitrosamine (DMN)/kg i.p. were 70% and 85% for normally-fed and protein-depleted groups, resp., while those that received 60 mg DMN/kg i.p. had survival rates of 25% and 58%, resp. In the early stages of the hepatic damage there was necrosis of both parenchymal cells and sinusoid lining cells, with complete disruption of the liver cell plates. This complete loss of structure resulted in a "punched-out" appearance of the centrilobular area with replacement by varying degrees of hemorrhage. Most central veins were patent, but in a few instances disruption of the central vein and larger collecting veins was seen. A condensation of the trabecular reticulin framework around the central veins was observed. Thus, the early rise in portal pressure may be a result of hemorrhagic necrosis and condensation of reticulin around the central veins without significant occlusion of the veins.

7044 HEMOLYTIC ANEMIA COMPLICATING HALOTHANE-INDUCED HEPATITIS. (E.) Ricci, J. A. (Polyclin. Hosp., Harrisburg, Pa.), R. C. Gross and L. H. Shields. *Pa. Med.* 74(3):57-59, 1971.

7045 ALCOHOLIC HEPATITIS. (E.) Davidson, C. S. *N. Engl. J. Med.* 284(24):1378, 1971.

7046 HEPATIC INJURY AFTER IRRADIATION. (Jap.) Sakamoto, Y. (U. Shinshu Sch. Med., Japan), T. Kasuga and T. Ohata. *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 30(2):120-130, 1970.

7047 PROPOXYPHENE (DARVON) HEPATOTOXICITY. (E.) Klein, N. C. (Stamford Hosp., Conn.) and M. G. Magida. *Am. J. Dig. Dis.* 16(5): 467-469, 1971.

7048 FURTHER ULTRASTRUCTURAL OBSERVATIONS ON INJURY OF RAT HEPATIC PARENCHYMAL CELLS INDUCED BY AFLATOXIN B_1. (E.) Butler, W. H. (Med. Res. Council Lab. Toxicol. Unit., Carshalton, Surrey, England). *Chem. Biol. Interactions* 4(1):49-65, 1971.

See also numbers: 6432, 6433, 6438, 6442, 6443, 6445, 6456, 6457, 6476, 6500, 6501, 6502

7049 SENSITIVITY OF A ONE-DAY COMPLEMENT FIXATION TEST FOR DETECTION OF HEPATITIS-ASSOCIATED ANTIGEN. (E.) Schmidt, N. J. (California State Dept. Health, Berkeley) and E. H. Lennette. *Health Lab. Sci.* 8(4):238-240, 1971.

The sensitivity of a 1-day complement fixation test for detection of hepatitis-associated antigen, with incubation for 1 hr at 37° C, was compared with the standard test with overnight fixation at 4°C. Of 144 sera (95 from hepatitis patients, 49 from the National Research Council's panel of sera), 86 (60%) showed the same complement fixation titers by both methods. Lower complement fixation titers with the 1-day test were obtained in 33% (90% of which were only 2-fold lower) while higher titers with the 1-day test were seen with 7% (again, 90% of which were only 2-fold lower). The slightly lower sensitivity of the 1-day test did not result in the failure to detect hepatitis-associated antigen in sera positive in the overnight test. The 1-day complement fixation test was slightly more sensitive than the immunoelectrophoresis for the detection of hepatitis-associated antigen.

7050 ORAL CONTRACEPTIVES AFTER LIVER DISEASE. (E.) Eisalo, A. (U. Helsinki Ist Med. Clin.), A. Konttinen and O. Hietala. *Br. Med. J.* 3(5774):561-562, 1971.

Oral contraceptives were administered to 10 women with viral hepatitis and 5 with obstructive jaundice 14 days after the bilirubin and serum aminotransferase tests had returned to normal. In some viral hepatitis patients the serum SGOT, SGPT or ornithine carbamyltransferase rose above the normal upper limit during the first month of oral contraception, but they returned to normal. The total serum bilirubin and alkaline phosphatase remained normal throughout the follow-up. When oral contraceptives were administered to women recovering from obstructive jaundice, serum enzymes stayed within normal limits except in 1 case in which the obstruction was caused by acute cholecystitis. Oral contraceptives seemingly had no adverse effect on liver function in women who had recovered from viral hepatitis or obstructive jaundice.

7051 HEPATITIS-ASSOCIATED ANTIGEN IN URBAN CHILDREN. (E.) Smithwick, E. M. (Downstate Med. Ctr., Brooklyn, N. Y.) and S. C. Go. *J. Pediatr.* 79(4):594-598, 1971.

Immunodiffusion studies were performed on sera from children with viral hepatitis, serum hepatitis, hematologic disorders, connective tissue disorders and infectious diseases in an attempt to detect hepatitis-associated antigen (HAA). Four of the 7 children with a diagnosis of hepatitis were HAA positive, and 3 of their 19 contacts were also HAA positive. Of the 7 children, 2 had serum hepatitis (both HAA posit and 5 had infectious hepatitis (2 were positive In the general hospital population, 2 of the 63 children tested for HAA were positive, neither of them having had transfusions. None of the 159 children with a variety of acute and chroni conditions involving the liver was HAA positive Only 1 of the 102 children with hematologic disorders was HAA positive. All of the children with connective tissue or infectious diseases were negative for HAA. Four of the 140 childre tested had antibodies to HAA; all 4 had thalass and received multiple transfusions, but none ha been known to have serum hepatitis. In a crowd urban area in which drug abuse is prevalent, children may be HAA positive as a consequence o exposure to HAA positive individuals.

7052 VIRAL HEPATITIS, TYPE B (MS-2 STRAIN) DETECTION OF ANTIBODY AFTER PRIMARY INFECTION. (E.) Lander, J. J., J. P. Giles, R. H. Purcell (NIH, Bethesda, Md.) and S. Kurgm *N. Engl. J. Med.* 285(6):303-307, 1971.

Anti-hepatitis associated antigen (anti-HAA) wa not detected in 75 serial serum specimens from of 8 patients who had MS-1 type hepatitis (high contagious short incubation type) by radio-immunoprecipitation. The anti-HAA was detecte by radio-immunoprecipitation in all 3 patients with MS-2 type hepatitis (long incubation type resembling serum hepatitis) who had transient hepatitis associated antigen (HAA) but no anti-HAA detectable by cesium chloride titer. Antib was detected 14, 27, and 57 days after the antigen was first detected. The antibodv persisted for at least 18 months after primary exposure and was found at a time when HAA was detectable in all patients in whom antibody ha developed. Antibody was detected in only 1 of patients who had MS-2 type hepatitis with persistent HAA. IgG antibody to HAA was detec after primary and secondary exposure to the antigen; IgM anti-HAA was detected in 2 of 4 patients after secondary exposure.

7053 CARDIAC MANIFESTATIONS OF VIRAL HEPATITIS. (E.) Bell, H. (U. Kansa Med. Ctr., Kansas City). *JAMA* 218(3):387-391, 1971.

Clinical evidence of cardiac involvement of 30 consecutive autopsied patients who died of acu viral hepatitis was studied. Important clinic findings were prolonged hypotension, cardiomeg pulmonary edema and sudden death. EKG abnorma ties included T-wave abnormalities, low voltag left axis deviation, and various arrhythmias no caused by electrolyte imbalance. Widespread petechial hemorrhage involving the subepicardi subendocardium, and interventicular septum was the most common pathological finding. Inflammatory infiltrations of lymphocytes, fatty degeneration, flabby dilated ventricles and edema of the subendocardial connective tissue were also seen. ECG monitoring and close observation for cardiac difficulties are seemingly important for patients hospitalized for viral hepatitis.

7054 INTRAHEPATIC EXPRESSION OF SERUM HEPATITIS VIRUS-ASSOCIATED ANTIGENS. (E.) Edgington, T. S. (Scripps Clin. Res. Found., La Jolla, Calif.) and D. J. Ritt. *J. Exp. Med.* 134(4):871-885, 1971.

Immunofluorescence was used to localize cytologic sites and patterns of serum hepatitis virus-associated antigen in the liver and blood. In acute hepatitis, this antigen was localized in the cytoplasm of hepatocytes. In chronic or recurrent hepatitis the antigen localized in other cells in the liver (especially the cytoplasm of Kupffer cells and sinusoidal lining cells) either alone or in addition to localization in hepatocytes. In patients who converted from acute to chronic hepatitis, this antigen was seen to persist in its intrahepatic localization.

7055 PROPERTIES OF A VIRUS ISOLATED FROM PATIENTS WITH MS-1 INFECTIOUS HEPATITIS. (E.) Melnick, J. (Baylor Coll. Med., Houston, Tex.), D. W. Boucher, J. Craske and J. Boggs. *J. Infect. Dis.* 124(1):76-85, 1971.

Following the induction of hepatitis in a patient 4 weeks after receiving serum containing the agent of MS-1 infectious hepatitis, a virus was isolated from acute phase plasma of the patient. The cytopathic effect of the virus in the cloned line of Detroit 6 cells was similar to that previously described. Cells in infected cultures became small, round and sharply outlined, and the confluency of the monolayer was lost, sometimes in 2-3 days. Lysates of cells from infected cultures yielded spherical viral particles with a diameter of 18-20 nanometers. Like other small viruses (picorna- and picodnaviruses) they resisted treatment with ether. The acute phase plasma, but not the preinfection serum, also produced interference against echovirus type 11 in primary cultures of human or simian renal cells. Five volunteers contracted hepatitis after oral passage of the virus-containing plasma, and a virus was isolated in D6 cells from acute phase plasmas of 4 of these patients. The acute phase plasma of 3 of the latter patients produced an interfering factor. Only the initial patient with hepatitis developed neutralizing antibodies to the cytopathic and interfering agent. Australia antigen was not found in either the original inoculum containing MS-1 or in the isolated virus.

7056 HOMOLOGOUS SERUM HEPATITIS AS A RESULT OF BLOOD TRANSFUSION FROM DONOR IN THE PERIOD OF INCUBATION OF VIRAL HEPATITIS. (Rus.) Puzevskii, I. I. *Zdravookhr. Beloruss.* 17(4): 78-79, 1971.

7057 A SEROLOGICAL SURVEY FOR AUSTRALIA ANTIGEN AND ANTIBODY. (E.) Newman, S. J. (Natl. Inst. Neurol. Dis. Stroke, Bethesda, Md.), D. L. Madden, G. L. Gitnick and J. L. Sever. *Am. J. Dis. Child.* 122(2):129-133, 1971.

7058 THE PROBLEM OF AUSTRALIAN ANTIGEN. (Rus.) Kantorovich, R. A. *Vopr. Virusol.* 16(3):259-269, 1971.

7059 VIRAL HEPATITIS. (Fr.) Lageron, A. (St. Antoine Hosp., Paris), G. Theodoropoulos, C. Laverdant and J. Caroli. *Rev. Med. Chir. Mal. Foie* 46(3):115-121, 1971.

7060 CLINICAL AND THERAPEUTIC FINDINGS IN 273 CASES OF VIRUS HEPATITIS. (It.) Niutta, R. (S. Carlo Hosp., Potenza, Italy), G. Elifani, M. Paterno and A. Urciuoli. *Minerva Med.* 62(13):600-605, 1971.

7061 ANIMAL EXPERIMENTS ON "MARBURG VIRUS" HEPATITIS. STUDIES ON GUINEA PIGS. (Ger.) Korb, G. (U. Marburg Inst. Pathol., Germany), W. Slenczka, H. Bechtelsheimer and P. Gedigk. *Virchows Arch.* [*Pathol. Anat.*] 353(2): 169-184, 1971.

7062 INCIDENCE AND CLINICAL SIGNIFICANCE OF THE OCCURRENCE OF THE Au ANTIGEN IN BLOOD DONORS (PRELIMINARY FINDINGS). (It.) Magni, E. (U. Milan 2nd Med. Clin., Italy), S. Del Prete, D. Costantino and M. Doglia. *Trasfus. Sang.* 16(2):172-175, 1971.

7063 CERTAIN PROBLEMS OF THE METHOD OF DETECTION OF THE PARENTERAL PATH OF INFECTION WITH VIRAL HEPATITIS. (Rus.) Iasinskii, A. A. *Mikrobiologiia (Mosk.)* 40(5):22-26, 1971.

7064 THE INCIDENCE OF AUSTRALIA ANTIGEN IN THE SERUM OF PATIENTS WITH ACUTE VIRAL HEPATITIS. (Pol.) Kassur, B. (Med. Acad. Clin. Infect. Dis., Warsaw, Poland), W. Brzosko and J. Januszkiewicz. *Pol. Arch. Med. Wewn.* 46(4): 453-459, 1971.

7065 THE INCIDENCE OF AUSTRALIA ANTIGEN IN THE SERUM OF PATIENTS AFTER ACUTE

VIRAL HEPATITIS. (Pol.) Januszkiewicz, J. (Med. Acad Clin. Infect. Dis., Warsaw, Poland), K. Madalinski, H. Poznanska and J. Wysocki. *Pol. Arch. Med. Wewn.* 46(4):431-435, 1971.

7066 VIRAL HEPATITIS: RECENT EXPERIENCE AT BROOKE GENERAL HOSPITAL. (E.) Collins, W. J. (Brooke Gen. Hosp., Fort Sam Houston, Tex.) and R. F. Wells. *Milit. Med.* 136(6):572-574, 1971.

7067 INFECTIOUS HEPATITIS AND APLASTIC ANEMIA. (E.) Hodgkinson, R. *Lancet* 1(7707):1014, 1971.

7068 AUSTRALIA ANTIGEN IN A HEMODIALYSIS AND KIDNEY TRANSPLANTATION UNIT. (Fr.) Leski, M. (Necker Hosp., Paris), C. Grivaux and A. M. Courouce Pauty. *J. Urol. Nephrol. (Paris)* 77(4-5):389-390, 1971.

7069 A RAPID AND SENSITIVE METHOD FOR THE DEMONSTRATION OF THE Au/SH ANTIGEN BY MEANS OF MICROMIGRATION ELECTROPHORESIS. (Ger.) Frank, K. H. (Carl Gustav Carus Med. Acad., Dresden, Germany) and W. Reimann. *Dtsch. Gesundheitsw.* 26(22):1042-1044, 1971.

7070 INFECTIOUS AND SERUM HEPATITIS. (E.) Turner, G. C. (Reg. Public Health Lab., Liverpool, England). *Br. J. Hosp. Med.* 5(3): 296-312, 1971.

7071 THE AUSTRALIA ANTIGEN: FACTS AND HYPOTHESES. (Fr.) Cazal, P. (Blood Transfus. Ctr., Montpellier, France), M. Robinet Levy, J. M. Lemaire and H. Michel. *J. Med. Montpellier* 5(10):468-474, 1970.

7072 QUANTITATION OF THE HEPATITIS-ASSOCIATED ANTIGEN BY ELECTROIMMUNODIFFUSION. (E.) Merrill, D. A. (U. Colorado Med. Ctr., Denver), P. F. Kohler and J. W. Singleton. *J. Allergy* 47(6):315-320, 1971.

7073 DIAGNOSTIC AND PROGNOSTIC IMPORTANCE OF TRANSFERRIN ASSAYS IN VIRAL HEPATITIS. (It.) Arcuri, F. (Civil Hosp., Genoa, Italy) and N. Piersantelli. *G. Mal. Infett. Parassit.* 22(10):659-660, 1970.

7074 CLINICAL SIGNIFICANCE OF AUSTRALIA ANTIGEN. (Jap.) Murakami, S. (Tokyo Women Med. Coll.). *Nippon Ishikai Zasshi (J. Jap. Med. Assoc.)* 64(12):1357-1365, 1970.

7075 VIRAL HEPATITIS: INCIDENCE IN AN ANTITUBERCULOUS HOSPITAL FOR CHILDREN. (Rus.) Bekker, A. A., B. A. Gerasun and I. S. Katushenko. *Probl. Tuberk.* 49(4):13-15, 1971.

7076 MORTALITY STATISTICS OF VIRUS HEPATITIS IN HUNGARY DURING THE YEARS 1950 TO 1969. (Hun.) Solt, K. *Nepegeszsegugy* 52(2): 117-119, 1971.

7077 HEPATITIS-ASSOCIATED ANTIGEN IN CHIMPANZEES. (E.) Maynard, J. E. (USPHS Dis. Control Ctr., Phoenix, Ariz.), W. V. Hartwell and K. R. Berquist. *J. Infect. Dis.* 123(6):660-664, 1971.

7078 THE HETEROGENEITY OF AUSTRALIA ANTIGEN. (E.) Le Bouvier, G. L. (Yale U. Sch. Med., New Haven, Conn.). *J. Infect. Dis.* 123(6): 671-675, 1971.

7079 FUNCTIONAL LESION OF THE PANCREAS IN VIRAL HEPATITIS. (Fr.) Laverdant, C. (Army Hosp., Paris), J. Meunier, C. Molinie and A. Baudet. *Ann. Gastroenterol. Hepatol.* 7(2): 119-136, 1971.

7080 AUSTRALIA SH ANTIGEN AND IMMUNOGLOBULINS IN AN EPIDEMIC OF VIRAL HEPATITIS. (E.) Malaviya, A. N. (All-India Inst. Med. Sci., New Delhi), S. K. Sama and K. Ramachandran. *Am. J. Trop. Med. Hyg.* 20(3):502-505, 1971.

7081 ROLE OF IMMUNE COMPLEXES INVOLVING SH ANTIGEN IN PATHOGENESIS OF CHRONIC ACTIVE HEPATITIS AND POLYARTERITIS NODOSA. (E.) Prince, A. M. (New York Blood Ctr., N. Y.) and C. Trepo. *Lancet* 1(7713):1309-1312, 1971.

7082 IMMUNOLOGIC AND ELECTROPHORETIC HETEROGENEITY OF HEPATITIS ASSOCIATED ANTIGEN. (E.) Kim, C. Y. (City Hosp., Boston, Mass.) and J. G. Tilles. *J. Infect. Dis.* 123(6): 618-628, 1971.

7083 VIRUS EXPERIMENTAL HEPATITIS IN MICE IN THE LIGHT OF SOME ENZYMATIC INDICATORS IN BLOOD SERUM OR PLASMA. (Cz.) Fassati, M. (Charles U. Sch. Gen. Med., Prague), E. Schon and P. Fassati. *Cesk. Epidemiol.* 20(2):75-85, 1971.

See also numbers: 6538, 6555, 6556

7084 ASPARTIC ACID IN THE TREATMENT OF CHRONIC HEPATITIS. (E.) Fodor, O. (Inst. Med. Res., Cluj, Rumania), F. Barbarino and S. Cotul. *Acta Hepatosplenol. (Stuttg.)* 18(5):383-395, 1971.

The effects of aspartic acid in chronic hepatitis and toxic experimental hepatitis are reviewed. Aspartic acid exerts a protective effect on the experimental hepatic lesions induced by CCl_4 in rabbits, guinea pigs and rats. When administered therapeutically (21 daily perfusions with a 5% solution of 1 g dl-aspartic acid in 5% glucose serum) to patients with chronic hepatitis, it causes an improvement both in clinical signs and symptoms. Improvements in serum iron, SGPT and SGOT, and increased protein synthesis (serum cholinesterase, serum albumin and serum prothrombin) are observed. Bilirubin metabolism and BSP retention tests also improved after 5 daily perfusions with aspartic acid. Aspartic acid has an ammonia-fixing effect in both spontaneous and induced hyperammonemia in patients with chronic hepatitis and liver cirrhosis. Serum enzyme activities after CCl_4 poisoning are decreased by protective treatment with aspartic acid. In these protected animals there is a limitation of necrosis, stimulation of regeneration, and restriction of the connective tissue proliferation. Radioisotope studies show improvement of altered methionine metabolism by aspartic acid both in rabbits and rats with toxic experimental hepatitis and in patients with chronic hepatitis. Thus, aspartic acid appears beneficial in the treatment of chronic hepatitis.

7085 ACTIVE CHRONIC HEPATITIS ASSOCIATED WITH POLYNEURITIS. (Fr.) Barrucand, D. (Clin. Med. B, Nancy, France), F. Vicari, G. Mauuary and J. Froment. *Ann. Med. Nancy* 9(12): 757-760, 1970.

7086 TREATMENT OF ACTIVE CHRONIC HEPATITIS. (It.) Corsini, G. (St. Chiara Hosp., Pisa, Italy). *Rec. Progr. Med. (Roma)* 50(4): 390-402, 1971.

7087 MANAGEMENT OF CHRONIC HEPATITIS. (E.) Anonymous. *Lancet* 1(7711):1221-1223, 1971.

See also number: 7054

CIRRHOSIS

7088 EXTRACORPOREAL IRRADIATION OF THE BLOOD: ATTEMPTED IMMUNOSUPPRESSIVE TREATMENT OF ACTIVE, NON-ALCOHOLIC CIRRHOSIS. (E.) Ranek, L. (Natl. Hosp., Copenhagen), V. Andersen, S. Jarnum, J. Nerup, K. Ramsöe, T. Schiödt, N. Tygstrup, B. Weeke and K. Westergaard. *Scand. J. Gastroenterol.* 6(5):389-396, 1971.

Irradiation-induced lymphocytopenia to suppress the liver immune processes by extracorporeal irradiation of the blood (ECI) did not improve liver function and was an unpromising mode of treatment in active cirrhosis of the liver. The technique employed a Scribner shunt placed in the forearm under local anesthesia and continuous infusion of heparin during ECI lasting 72- 111 hr. Patients suffered from various degrees of abdominal discomfort with nausea and vomiting during ECI. Four patients with active, non-alcoholic cirrhosis and high serum gamma globulin levels were treated with ECI. One patient died from bleeding stomach ulcers; 3 showed an increase in galactose elimination capacity and prothrombin concentration; other liver function tests showed no change; both serum immunoglobulin concentrations and IgG turn-over rate were unaffected; and 2 liver biopsies 3 min after EGI showed no change in lymphocyte and plasma cell infiltration.

7089 EFFECTS OF PENTAGASTRIN ON INSULIN SECRETION. (Fr.) Kaess, H. (Univ. Med. Clin., Heidelberg, Germany), G. Schlierf and S. Lackas. *Arch. Fr. Mal. App. Dig.* 60(6-7, Suppl. 2):137-142, 1971.

In 6 normal subjects s.c. administration of pentagastrin (6 µg/kg) increased gastric acid secretion rapidly but had no effect on blood insulin or glucose levels. During i.v. infusion of pentagastrin (0.1 µg/kg/min) to 6 cirrhotic patients who had portacaval anastomoses, blood glucose, insulin, and fatty acid levels remained essentially unchanged; minor changes in insulin levels might be a manifestation of reduced liver clearance of insulin. Blood glucose and insulin levels remained unchanged in the hepatic vein and peripheral venous blood during i.v. infusion of pentagastrin; glucose and insulin levels were slightly higher in the hepatic vein. In normal subjects secretin (0.5 U/kg i.v.) caused a rapid but transitory increase in blood insulin levels. Infusion of pentagastrin (0.06 μg/kg/min) decreased the effect of a second injection of secretin which would normally have the same effect as the first. The inhibitory and indirect stimulating effects of gastrin on insulin liberation are an important factor in Zollinger-Ellison syndrome since only 10% of the patients with this syndrome have high blood insulin levels.

7090 LIVER CIRRHOSIS. CLINICAL EXPERIENCE WITH 274 UNSELECTED CASES. (E.)

Pinto Correia, J. (Univ. Hosp., Santa Maria, Portugal), M. E. Areias, E. Monteiro, M. Garnel and F. Madeira. *Digestion* 4(4):223-233, 1971.

Subjects consisted of 274 patients (72% males, 28% females) most of whom were over 40 yr old. About 50% were symptomatic for less than 1 yr, and about 10% had been symptomatic for more than 5 yr. The most common clinical stigmata were ascites (76%), jaundice (62%), asterixis and/or fetor hepaticus (57%) and coma (53%). There was a history of alcoholism in at least 73%, and 51% admitted to being heavy drinkers. The clinical picture was similar in those with alcoholism (188) and without (86), although asterixis and feter were more common in alcoholics. Compensated cirrhosis was 3 times as common in those who denied alcoholism as in the alcoholics. The most sensitive liver function tests were the prothrombin time, BSP retention test, and the cephalin-cholesterol and thymol flocculation tests. The overall mortality was 32.8% (36.3% in males, 23.7% in females). The mortality was 36% in alcoholics and 15% in non-alcoholics. Death in hepatic coma occurred in 52%, of whom half had gastrointestinal bleeding (which was the single cause of death in 25% of 111 cases). The mortality was significantly increased in those with coma with jaundice or those with coma plus ascites or hyponatremia (serum sodium less than 125 mEq/liter). The mortality rate was not influenced by the presence of either ascites or jaundice alone. A 50% mortality rate was observed in those with esophageal varices.

7091 CLASSIFICATION OF CIRRHOSIS. THE RESOLUTION OF DATA MODES AND THEIR RECOVERY IN AN INDEPENDENT MATERIAL. (E.)

Winkel, P. (Natl. Hosp., Copenhagen) and N. Tygstrup. *Comput. Biomed. Res.* 4(4):417-426, 1971.

The Sneath and Wishart methods for numerical taxonomical analysis were compared as to classification of 400 patients with cirrhosis of the liver. Classification according to Sneath's method resulted in the formation of 2 distinct groups with different clinical and biochemical characteristics. This system was reproduced by Wishart's method by a modification designed to counteract the linking of data modes. Using Wishart's taxonomical principle, a classification key allowed allocation of previously unclassifiabl patients into 1 of the 2 classified groups. The 2 resulting groups were very much like those created by the taxonomical analysis with respect to features that were not used for the classification. Resolution and analysis of data modes of an independent material of 72 patients with cirrhosis demonstrated some general structure as found in the original material.

7092 MUSCLE BIOPSY STUDIES IN LIVER CIRRHOSI (E.)

Maschio, G., A. D'Angelo, F. Sirigu, E. Ossi, R. Polin, U. Fagiolo and R. Naccarato (Univ. Clin., Padua, Italy). *Scand. J. Gastroenterol.* 6(4):363-368, 1971.

Extracellular alkalosis, of both respiratory (mostly) and metabolic origin, was present in 15 of 22 patients with decompensated cirrhosis of the liver. Mean values of plasma osmolarity and sodium, potassium, chloride, magnesium and calciu concentrations were low borderline. Metabolic balance studies showed a reduced urinary output, and hence a positive balance, of water, sodium and chloride, whereas calcium excretion was withi normal limits. Muscle composition analyses showed increased water content, both in the extracellular and intracellular phases. A positive correlation between total muscle water and extracellular or intracellular water content was found. Sodium and chloride concentrations also increased in muscle tissue. Values of potassium, magnesium, and protein nitrogen were slightly reduced, with normal mean values for the potassium/nitrogen ratios. Histologically, edema, nucleosis and less frequently atrophy were the most common findings, which may be attributable to either the effects of oversecretion and impaired metabolic degradation of aldosterone and antidiuretic hormone, or to the loss of body cellular mass, often found in severe liver disease.

7093 PERITONITIS DUE TO SALMONELLA TYPHIMUR COMPLICATING NUTRITIONAL CIRRHOSIS.

(E.) Hirschman, S. Z. (Mt. Sinai Sch. Med., New York, N. Y.) and S. Murphy. *Mt. Sinai J. Med. NY* 38(5):470-473, 1971.

A case history is briefly reported of a 40-yr-ol Puerto Rican woman who developed a Salmonella typhimurium peritonitis without overt septicemia appendicitis or intestinal perforation. Althoug the Salmonella organism, was cultured from the ascites fluid cultures of stool, urine and blood were negative. She made an uneventful recovery on chloramphenicol.

7094 RELATION BETWEEN SO-CALLED SMALL INTESTINE PHOSPHATASE AND SERUM

PSEUDOCHOLINESTERASE IN CIRRHOSIS. (Ger.) Gerlach, U. (Med. Clin., Munster i. Westphalia, Germany), G. Eberhardt, L. Paul, W. Oberwittler and N. van Husen. *Klin. Wochenschr.* 49(17): 997-998, 1971.

The activity of the isoenzyme, "small intestine phosphatase", was increased in sera from 13 of 30 patients with a histological diagnosis of active cirrhosis. A negative correlation was found between the occurrence of this enzyme and serum pseudocholinesterase activity; "small intestine phosphatase" was found significantly more often in patients with low serum cholinesterase values but was never found in patients with more than 2500 mU/ml cholinesterase.

7095 EFFECT OF CHOLECYSTOKININ PANCREOZYMIN ON BILE SALT SECRETION INTO THE DUODENAL JUICE IN PATIENTS WITH LIVER CIRRHOSIS. (E.) Bode, C. (Philipps U., Med. Clin., Marburg/Lahn, Germany), H. Goebell and W. Kehl. *Klin. Wochenschr.* 49(15):881-883, 1971.

7096 DIAGNOSTICS OF FATTY LIVER. (Ger.) Nilius, R. (Martin Luther U., 1st Med. Clin., Halle, Germany), L. Otto, M. Morl and H. Enke. *Dtsch. Gesundheitsw.* 26(21):953-958, 1971.

7097 TESTOSTERONE TREATMENT OF LIVER CIRRHOSIS. (Rus.) Baloch, P. and I. Budavari. *Sov. Med.* 34(5):143-145, 1971.

7098 PREGNANCY ASSOCIATED WITH CIRRHOSIS AND CHRONIC HEPATITIS. (Ger.) Huchzermeyer, H. (Dr. Schorlemmers Private Hosp., Bad Godesberg, Germany). *Acta Hepatosplenol. (Stuttg.)* 18(4): 294-305, 1971.

7099 ASCITES AND ALCOHOLIC CIRRHOSIS. (Fr.) Gastard, J. (CHU Med. Serv. E, Pontchaillou Rennes, France), P. Cousin and G. Boullier. *Ann. Gastroenterol. Hepatol. (Paris)* 7(2):137-143, 1971.

7100 IRON KINETICS OF LIVER DAMAGED BY ALCOHOL. (Ger.) Klotz, H. G. (Univ. 1st Med. Clin., Vienna), K. Irsigler and K. Krypsin Exner. *Acta Hepatosplenol. (Stuttg.)* 18(2):73-83, 1971.

7101 SCLERODERMA ASSOCIATED WITH HEPATIC CIRRHOSIS. A REPORT OF THREE CASES AND A REVIEW OF THE LITERATURE. (Fr.) Thomas, M. (St. Antoine Hosp., Paris) and P. Gateau. *Rev. Med. Chir. Mal. Foie* 46(2):81-87, 1971.

7102 CORONARY ATHEROSCLEROSIS IN CIRRHOTICS. (ANATOMICAL STUDY OF 50 CASES). (Fr.) Nicolas, G., A. Gaillard, J. B. Bouhour and J. Horeau. *Rev. Alcool.* 16(4):274-280, 1970.

See also number: 6538

GALLBLADDER AND BILIARY TRACT DISEASES

7103 INTRAMURAL LESIONS OF THE GALLBLADDER. (E.) Ochsner, S. F. (Ochsner Clin., New Orleans, La.). *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 113(1):1-9, 1971.

Lesions involving the wall of the gallbladder below the mucosal surface, which produce visible changes on cholecystography, but rarely considered as a group were used to point out the versatility of cholecystography. Intramural diverticulosis, intramural gas, localized intramural granuloma, submucosal calcification, cystic lesions of wall, and adenomyomas were encountered. Sarcoma of the wall of the gallbladder was not encountered in this study. Proper identification of these lesions would depend on knowing the usual roentgenographic appearance. Intramural diverticulosis (Aschoff-Rokitansky sinuses) showed numerous small areas of opacification surrounding the lumen; intramural gas associated with poorly controlled diabetes showed small radiolucent collections of gas in the gallbladder area and once diagnosed responded to vigorous therapy; intramural granuloma may show a deformed or stenotic lumen; submucosal calcification showed linear, flaky, or plaque-like calcifications suggesting a gallbladder outline; rare cystic lesions of the wall showed an oval defect in the lateral aspect of the gallbladder; and adenomyomas showed a small filling defect at the fundus of the gallbladder. Only 1 neoplasm, a metastatic renal carcinoma, was visualized preoperatively.

7104 ROLE OF INSULIN IN REGULATING MOTILITY OF THE BILE-SECRETING SYSTEM IN THE

LIVER. (Rus.) Lapin, E. F. (Med. Inst., Tomsk, USSR) and A. A. Potapov. *Fiziol. Zh. SSSR* 57(8): 1172-1177, 1971.

Biliary dyskinesia developed in dogs within 10-15 days after administration of alloxan (70-80 mg/kg i.v.). Alloxan-induced diabetes decreased the duration of gallbladder contractions after the feeding of meat and increased the tonus of Oddi's sphincter at the distal end of the common bile duct; the latent period before bile secretion began increased and the total volume of bile secreted decreased. These disturbances became more pronounced with time so that in 2 dogs only small amounts of bile with a high bilirubin concentration were secreted 70-78 days after administration of the alloxan, indicating that cholestasis was present. These disturbances in motility disappeared when diabetic dogs were treated with insulin (0.5 IU/kg s.c.). It is concluded that insulin helps to regulate bile secretion.

7105 EXPERIMENTAL MANAGEMENT BY NONOPERATIVE ADRENERGIC STIMULATION OF SIMULATED COMMON DUCT STONES. (E.) Dardik, H. (Montefiore Hosp., Bronx, N. Y.), T. Beneventano, R. Rosen, M. L. Gliedman and C. J. Schein. *Am. J. Dig. Dis.* 16(4):321-326, 1971.

The effect of isoproterenol on ampullary flow and the passage of foreign bodies through the choledochus was studied in dogs to determine if pharmacologic manipulation of adrenergic receptors within the biliary tract can facilitate the passage of retained common duct stones into the intestine. Neither isoproterenol infusion nor vagotomy had any effect on the flow rate of saline through the ampulla, but both elicited flow at a lower intracholedochal pressure than that seen in untreated animals. Subsequent flow rates also showed no significant differences at each level of intracholedochal pressure increments. The mean control pressure for passage of the foreign body (No. 4 shot) into the duodenum was 250 mm Hg. This was decreased by 46% with simultaneous infusion of isoproterenol to a mean of 150 mm Hg. Within 1 hr after isoproterenol infusion ceased, the pressure required for passage of the shot returned to within 13% of the control mean value. Thus, stimulation of β receptors with isoproterenol may be useful in the management of patients having difficulty in passing cholodochal calculi.

7106 ABSORPTION OF VITAMIN E IN CHILDREN WITH BILIARY OBSTRUCTION. (E.) Harries, J. T. (Hosp. Sick Child., London) and D. P. R. Muller. *Gut* 12(7):579-584, 1971.

The intestinal absorption of vitamin E was studied in 17 children with liver disease in association with a severe degree of biliary obstruction. All the patients with obstructive jaundice (14) had low serum levels of vitamin E and increased peroxide hemolysis compared with 22 children who did not have malabsorption. Large doses of vitamin E given orally yielded no rise in serum vitamin E levels in any of the 3 children tested. Administration of vitamin E i.m. was followed by increased serum vitamin E levels and a decrease to normal levels of peroxide hemolysis. Vitamin E levels remained at, or fell below, pretreatment values despite large daily doses (30-266 mg/kg body weight/day) of either fat-soluble or water-miscible vitamin E preparation for periods ranging from 2 months to 3 yr. In 3 children absorption improved during periods of improving biliary obstruction.

7107 CHOLANGIOCARCINOMA. (E.) Kaude, J. and R. Rian (Henry Ford Hosp., Detroit, Mich.). *Radiology* 100(3):573-580, 1971.

Angiographic, historical, and clinical findings in 16 cases of primary bile duct carcinoma are described. There were twice as many females as males, and the average age was 66 yr. Medical history included cholelithiasis (56%), pain (69%) and occasional biliary cirrhosis secondary to obstruction. On physical examination, jaundice and occasional palpable abdominal masses were seen in cases of cholangiocarcinoma. In an angiographic comparison of cholangiocarcinoma, hepatoma, and metastatic carcinoma, encasement or obstruction of hepatic arteries was more prevalent in cholangiocarcinoma and metastatic carcinoma, whereas encasement of portal veins and displacement of vessels was associated primarily with hepatoma. Thin, irregular neoplastic vessels were identified in 81% of cholangiocarcinomas. The most common sites of cholangiocarcinoma were the junction of the cystic and hepatic ducts, and the distal common bile duct. In view of the clinical diagnostic difficulties encountered in this series of cholangiocarcinomas, including negative findings on needle or open liver biopsies, angiography contributed to diagnosis, and in some cases was the only method by which the correct diagnosis was made.

7108 DIAGNOSTIC AND THERAPEUTIC PROBLEMS IN BILIARY ATRESIA. ANALYSIS OF 40 CASES. (Ger.) Welte, W. (Cologne City Hosp. Surg. Clin., Germany). *Dtsch. Med. Wochenschr.* 96(21):899-908, 1971.

Of 52 children admitted for suspected biliary atresia the diagnosis was confirmed in 40 cases. These included 3 with intrahepatic atresia, 17 with complete and partial extrahepatic atresia, 8 with intrahepatic hypoplasia, 3 with intra and extrahepatic hypoplasia and 6 with a combination of extrahepatic atresia with intrahepatic hypoplasia. Among the 12 initially misdiagnosed cases there were 7 with hepatitis, 1 pancreatic fibrosis, 1 cirrhosis of unknown origin, 1 cyst of the intrahepatic biliary duct, 1 cyst of the choledochus and 1 suspected biliary duct stresia. Surgical procedures and histological findings are discussed, and the diagnostic value of preoperative percutaneous liver biopsy (Menghini's method) combined with the ^{131}I rose bengal test (especially for exclusion of hepatitis) are stressed. The importance of correct preoperative diagnosis of hepatitis is emphasized. Artificial bile ducts for drainage were constructed in 13 patients but did not substantially prolong survival. The high incidence of biliary atresia was noteworthy; intrahepatic hypoplasia had a better prognosis than all other forms. Two siblings had similar abnormalities (intrahepatic hypoplasia in one, intrahepatic atresia with extrahepatic hypoplasia in the other) but genetic, seasonal or regional differences in incidence were not found.

7109 EXPERIMENTAL CHOLELITHIASIS IN MICE. COMPARISON OF THE EFFECT OF CHOLIC AND TAUROCHOLIC ACIDS WITH OR WITHOUT CHOLESTEROL. (Fr.) Gerolami, A. (Natl. Inst. Health Med. Res., Marseille, France), C. Crotte, A. Mule, Y. Varette and H. Sarles. *Arch. Fr. Mal. App. Dig.* 60(3, Suppl. 1):23-32, 1971.

Cholelithiasis was produced in female Swiss mice by adding 0.5% cholic acid to a low-cholesterol diet, but cholesterol gallstones developed much more rapidly in mice given both cholic acid and 1% cholesterol. Addition of 0.65% taurocholic acid retarded development of gallstones in mice on low-cholesterol diets and those given 1% cholesterol. After 1 month gallbladder lesions were most pronounced with the cholesterol and cholic acid diet. Gas chromatographic analyses of bile samples showed significant and identical increases in bile acids and phospholipids in all animals given lithogenic diets for 15 days. Ratios of bile salts/cholesterol and bile salts/fatty acids were identical in hepatic and gallbladder bile. By means of Small diagrams it was demonstrated that both hepatic and gallbladder bile were almost saturated with free cholesterol after 15 days of the lithogenic diet.

7110 THE CLINICAL SIGNIFICANCE OF THE DIAMETER OF THE COMMON BILE DUCT IN CHOLECYSTECTOMIZED PATIENTS. (E.) Reiss, R. (Tel Aviv U. Med. Sch.) and S. Pikielny. *Isr. J. Med. Sci.* 7(9):1070-1072, 1971.

The size of the common bile duct (CBD) and the response of the sphincter of Oddi to morphine was studied in 150 patients at the time of cholecystectomy and 1 yr after surgery. The average size of the CBD at the time of surgery was 9 mm, with 30% of the CBD's with a diameter ranging between 10 and 14 mm showing abnormal feedings. One yr after surgery, both the average CBD diameter (9.1 mm) and the distribution of the various size ranges conformed very well to the operative findings. Of these patients, 117 (78%) showed no change in size during the yr following cholecystectomy, 25 (17%) showed an increase of greater than 3 mm, and 8 (5%) showed a decrease of more than 3 mm. All patients with serious biliary symptoms showed some degree of CBD enlargement. There was no correlation between the presence of symptoms and sphincter function as measured by the response to morphine, which was present in about 80% of all cases.

7111 THE RELATIONSHIP OF CHOLELITHIASIS TO VAGOTOMY. (E.) Mujahed, Z. (New York Hosp.-Cornell Med. Ctr., N. Y.) and J. A. Evans. *Surg. Gynecol. Obstet.* 133(4):656-658, 1971.

The incidence of cholelithiasis after vagotomy was determined in 262 patients who underwent truncal vagotomy during the last 25 yr. In this group, 7 patients developed cholelithiasis after vagotomy as proven by cholecystectomy (6 patients) or autopsy (1 patient). The remaining 255 patients were free of gallbladder disease as determined by oral cholecystography (41 patients), autopsy (7), or on clinical grounds (207). The incidence of cholelithiasis was 3% in males and 1.4% in females after vagotomy. When these results were compared with the expected occurrence of cholelithiasis in a comparable population in which none underwent vagotomy, they were found to be similar in all important respects. In this population the incidence of cholelithiasis was 2.9% in males and 5.9% in females. Thus, an increased incidence of cholelithiasis does not occur after vagotomy.

7112 CHOLELITHIASIS AND IMMIGRATION. (E.) Loftus Hills, L. (U. Melbourne Dept. Surg., Victoria, Australia). *Med. J. Aust.* 2(2):94-95, 1971.

A survey of 396 consective cases of proven cholelithiasis in women seen at the Royal Melbourne Hospital over a 20-month period is reported. The incidence of gallstone disease among women who had migrated to Australia from Italy, Greece, Malta and Cyprus was 9.3% compared with 2.5% for Australian-born women. The overall incidence in Italy was 1.5%, and this was similar to the 1.7% incidence for all Australians but quite different than the 4.8% for the southern Europeans in Australia. The mean age of the southern European women was 14 yr less than the Australians and they were most likely to develop symptoms 2-5 yr after arriving in Australia. Multiparity had no effect on the difference in incidence. Obesity was the same in European and Australian women. The only significant parameter detected was an increased consumption of fat and a decreased consumption of carbohydrate after migration.

7113 BILIARY TRACT DISEASE IN SICKLE CELL ANEMIA: SURGICAL CONSIDERATIONS.

(E.) Cameron, J. L. (Johns Hopkins Med. Inst., Baltimore, Md.), W. C. Maddrey and G. D. Zuidema. *Ann. Surg.* 174(4):702-710, 1971.

The records of 147 patients with sickle cell anemia were reviewed to determine the incidence of biliary tract disease. Of the 47 patients for whom enough information was available to establish the presence or absence of biliary tract disease, 33 patients (or 22% of the entire 147 patients) had proven disease. The incidence was 34% when only those patients 15 yr of age and over were considered. Of the 33 patients in whom biliary tract disease was established, 61% (20 patients) had opaque stones with 6 patients having common duct stones. Thirty-one of the 147 patients in this series had clinical symptoms or episodes that could be attributed to biliary tract disease. Ten of the 33 patients with known biliary tract disease underwent cholecystectomy with no postoperative complications or mortality. Fifty-six of the 147 patients underwent one or more general anesthesias for a variety of surgical procedures with no operative mortality and no wound healing problems. Twenty-three of the 73 females in this series underwent a combined total of 50 pregnancies. There was considerable maternal morbidity, crises during and immediately after pregnancy were frequent, and transfusions during pregnancies were common.

7114 NUTRIENT INTAKE OF PIMA INDIAN WOMEN: RELATIONSHIPS TO DIABETES MELLITUS AND GALLBLADDER DISEASE. (E.) Reid, J. M. (Natl. Inst. Arthritis Metabol. Dis., Bethesda, Md.), S. D. Fullmer, K. D. Pettigrew, T. A. Burch, P. H. Bennett, M. Miller and G. D. Whedon. *Am. J. Clin. Nutr.* 24(1):1281-1289, 1971.

Subjects consisted of 277 Pima Indian women (25-44 yr of age), all of whom had sufficient dietary intakes of calories, protein, iron, calcium and magnesium. Although their ratio of polyunsaturated/saturated fats was lower than desirable, it was essentially that seen in the rest of the United States. Dietary intake of carbohydrates and sucrose was lower in diabetics than in nondiabetics. Women employed outside the home had a lower caloric intake and a greater animal protein intake than homemakers. There were no differences in any of the measured parameters between women with and without gallbladder disease. Neither diabetes nor gallbladder disease could be correlated with dietary intake of selected nutrients.

7115 ANGIOGRAPHY OF CANCER OF THE GALLBLADDER. (Jap.) Kido, C., T. Sasaki and M. Kaneko. *Rinsho Hoshasen* 16(1):63-69, 1971.

7116 PRIMARY SCLEROSING CHOLANGITIS. (E.) Perry, A. W. (White Mem. Med. Ctr., Los Angeles, Calif.), E. Djang, G. Kafrouni and L. G. Ludington. *Am. J. Surg.* 121(6):743-745, 1971.

7117 A CASE OF CICATRICIAL ORIGIN OF ATRESIA OF THE EXTRAHEPATIC BILIARY TRACT. (Sp.) Gubern Salisachs, L., M. Escude Casals and L. Gubern Pi. *Bol. Soc. Vasco-Navarra Pediatr.* 5(18):195-197, 1970.

7118 SCINTISCANNING WITH ^{131}I LABELED ROSE BENGAL IN CALCULOUS CHOLECYSTITIS. (It.) Cattaneo Godio R. (U. Turin Inst. Gen. Clin. Med., Italy), M. D'Onofrio, S. Gabasio and F. Pugliese. *Minerva Med.* 62(42):2131-2136, 1971.

7119 INTRAOPERATIVE CHOLANGIOGRAPHY. (Pol.) Bernacki, E. (Med. Acad Inst. Surg., Bialystok, Poland). *Pol. Tyg. Lek.* 26(14): 515-518, 1971.

7120 PREOPERATIVE CHOLANGIOGRAPHY IN THE PRESENCE OF JAUNDICE. (E.) Faithfull, G. R. (Repatriation Gen. Hosp., Concord, Australia) and P. T. Anderson. *Med. J. Aust.* 2(4):193-195, 1971.

7121 HISTOLOGICAL CRITERIA FOR EXTRAHEPATIC CHOLESTASIS. (Fr.) Gardiol, D. (U. Lausanne Inst. Pathol. Anat., Switzerland) and P. Loup. *Acta Hepatosplenol. (Stuttg.)* 18(4): 253-261, 1971.

7122 EFFECT OF IODIZED ROENTGEN CONTRAST SUBSTANCES ON THE BILIARY TRACT, LIVER AND PANCREAS DURING CHOLANGIOGRAPHY. (Rus.) Solk, V. R. *Klin. Khir.* 51(3):30-32, 1971.

7123 ISOLATED NECROSIS OF THE GALLBLADDER AS SEQUEL TO AN ACCIDENT. (Ger.) Vorster, C. (U. Wurzburg Surg. Clin., Germany) and G. Bottcher. *Chir. Praxis* 15(1):45-49, 1971.

7124 EFFECTIVENESS OF CHOLEDOCHODUODENOSTOMY AND TRANSDUODENAL SPHINCTEROTOMY IN THE TREATMENT OF BENIGN OBSTRUCTION OF THE COMMON DUCT. (E.) Thomas, C. G., Jr. (U. North Carolina Sch. Med., Chapel Hill), C. P. Nicholson and J. Owen. *Ann. Surg.* 173(6):845-856, 1971.

7125 AGENESIS OF THE GALLBLADDER. (Nor.) Liavag, I. (Deaconess Hosp., Louisenberg, Norway) and K. Kveim Lie. *Tidsskr. Nor. Laegeforen.* 91(16):1226-1227 & 1231, 1971.

7126 ABNORMAL PATTERNS OF THE NETWORK OF BILIARY CANALICULI. (Sl.) Horvath, A.

(L. Derera Acad Bratislava, Czechoslovakia) and J. Horvathova. *Cesk. Patol.* 7(2):92-97, 1971.

7127 A CALCIFIED MASS IN THE RIGHT HYPOCHONDRIUM: 'PORCELAIN' GALLBLADDER IN A YOUNG ADULT. (Fr.) Cocheton, J. J. (Tenon. Hosp., Paris), J. Poulet, H. Duclos and P. Librez. *Ann. Med. Interne (Paris)* 122(6-7):721-725, 1971.

7128 SUDDEN DEATH DUE TO ENDOCHOLECYSTIC ECHINOCOCCOSIS. (It.) Patumi, F. (U. Perugia Inst. Leg. Med., Italy). *Minerva Medico Leg.* 90(2):35-39, 1970.

7129 TUMOR OF THE AMPULLA. ETIOLOGIC ASPECTS AND DIAGNOSTIC PROBLEMS. REPORT ON SIX CASES WITH PROTRACTED EVOLUTION. (Fr.) Léonard, P. *Acta Gastroenterol. Belg.* 34(6): 455-471, 1971.

7130 PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF THE BILE IN CHRONIC CHOLECYSTITIS. (Rus.) Chernomorets, N. N. *Sov. Med.* 34(1):101-105, 1971.

7131 CHOLEDOCHO-INTESTINAL FISTULA. REPORT OF 3 CASES. (Fr.) Runser, C. (Cent. Reg. Hosp., Besancon, France), P. Milleret, H. Gisselbrecht and J. P. Maurat. *Sem. Hop. Paris* 47(19):1248-1251, 1971.

7132 FALSE FILLING DEFECTS IN NECK OF GALLBLADDER. (E.) Kriss, N. (Gen. Hosp., Geneva, N. Y.). *NY State J. Med.* 71(10): 1079-1083, 1971.

7133 CONSERVATIVE TREATMENT OF BILIARY TRACT DISEASES. (Ger.) Boecker, W. (Frauenberg GmbH, Bad Mergentheim, Germany). *Med. Welt (Stuttg.)* 22(10):387-391, 1971.

7134 ACCELERATED CHROMATIC DUODENAL PROBING IN THE RAPID DIAGNOSIS OF ACUTE CHOLECYSTITIS. (Rus.) Dikhtenko, G. I. *Klin. Khir.* 51(3):13-17, 1971.

7135 BILIARY TRACT OPERATIONS IN A RURAL SURGICAL PRACTICE. A REVIEW OF 350 OPERATIONS. (E.) Watkins, G. L. (Washington U. Sch. Med., St. Louis, Mo.). *Am. J. Surg.* 121(5): 518-521, 1971.

7136 CONGENITAL DILATATION OF THE BILIARY TRACT. (E.) Lorenzo, G. A. (Northwestern U. Med. Sch., Chicago, Ill.), R. W. Seed and J. M. Beal. *Am. J. Surg.* 121(5):510-517, 1971.

7137 HEPATIC LIPID SECRETION AND CHOLELITHIASIS. (E.) Soloway, R. D. (Mayo Clin., Rochester, Minn.), J. L. Thistle and L. J. Schoenfield. *Am. J. Dig. Dis.* 16(5):437-454, 1971.

7138 BLEEDING INTO THE DIGESTIVE TRACT FROM LITHIASIS OF THE PANCREATIC DUCT. (Pol.) Lewicki, K. (Med. Acad. 3rd Surg. Clin., Gdansk, Poland) and J. Dilaj. *Pol. Przegl. Chir.* 43(4):639-640, 1971.

7139 RESULTS OF TREATMENT OF INJURIES OF THE EXTRAHEPATIC BILIARY TRACT. (Ger.) Mlynek, H. J. (Karl Marx U., Surg. Clin., Leipzig, Germany) and U. Schenker. *Zentralbl. Chir.* 96(16):542-547, 1971.

7140 BILIRUBIN METABOLISM, NORMAL AND PATHOLOGICAL. (Fr.) Hecht, Y. (St. Antoine Hosp., Paris). *Rev. Med. Chir. Mal. Foie* 46(2):53-60, 1971.

7141 ADENOMYOMATOSIS OF THE GALLBLADDER. REPORT OF A CASE. (E.) Sigstad, H. (Univ. Hosp., Oslo, Norway), T. Haugland, B. Fretheim and K. Elgjo. *Acta Chir. Scand.* 137(2): 185-188, 1971.

7142 CONGENITAL DILATATION OF THE COMMON BILE DUCT. A CASE REPORT. (E.) De Moulin, D. (St. Liduina Hosp., Boxtel, Netherlands) and J. De Vos. *Arch. Chir. Neerl.* 23(1):1-6, 1971.

7143 CLOSED TRAUMA OF THE COMMON BILE DUCT WITH RUPTURE OF THE HEPATIC ARTERY. (Fr.) Louyest, J. (St. Annadal Hosp., Maastricht, Netherlands) and H. A. J. Lemmens. *Acta Chir. Belg.* 69(7):621-630, 1970.

7144 CLINICAL RELATIONSHIPS OF GALLSTONES. (E.) Kaye,,M. D. (U. Colorado Med. Ctr., Denver) and F. Kern. *Lancet* 1(7711): 1228-1230, 1971.

7145 THE 'POSTCHOLECYSTECTOMY SYNDROME'. RESIDUAL AND SUBSEQUENT COMPLAINTS AFTER SURGERY ON THE BILE PASSAGES FOR LITHIASIS. (Ger.) Schmidt, H. D. (City Hosp., Karlsruhe, Germany). *Fortschr. Med.* 89(10):433-436, 1971.

7146 INCIDENCE OF GALLSTONES AND GALLSTONE DISEASE. EPIDEMIOLOGIC PROBLEMS OF CHOLELITHIASIS. (Ger.) Salzer, G. M. (Univ. Surg Clin., Innsbruck, Austria) and E. Hagleitner. *Bruns Beitr. Klin. Chir.* 218(6):487-493, 1971.

7147 THE RESTORATION OF CELLULAR FUNCTION AND STRUCTURE OF THE LIVER AFTER OBSTRUCTION OF THE COMMON BILE DUCT IN DOGS. (Rus.) Mansurova, I. D. (Inst. Gastroenterol., Dushanbe, USSR), V. I. Antonovich and L. G. Kaletkina. *Biull. Eksp. Biol. Med.* 71(5):43-47, 1971.

See also numbers: 6534, 6551, 6552, 6553, 6554, 6693, 6950, 7050

7148 LEUCINE AMINOPEPTIDASE IN BILIARY AND PANCREATIC OBSTRUCTION AND OTHER METABOLIC DISORDERS. (E.) Casey, A. E. (Mem. Inst. Pathol., Longview, Ala.), F. E. Gilbert, H. L. Lohmann, H. Proelss and E. Downey. *Ala. J. Med. Sci.* 8(3):304-313, 1971.

Serum leucine aminopeptidase (LAP) levels in 17,431 consecutive admission metabolic profiles were correlated with chemical and clinical syndromes. The mean serum LAP was 151 Goldbarg-Rutenburg U (GRU), the median 134, and the mode 121. In 67% of the female patients and 73% of the males, the serum LAP level was elevated above the mode of 121 GRU. In normal pregnancy, delivered and undelivered, the LAP rose to high levels. The LAP was also elevated in 10 disease states associated with obstruction of the biliary ducts, intra- or extra-hepatic, including ampulla of Vater and pancreatic ducts. Total serum LAP was significantly reduced in females with diverticulosis, peritonitis, males and females with cancer of the stomach and intestine, benign tumors, anemia, intestinal obstruction, hemorrhage, and males with phlebitis, displaced disc and rheumatoid arthritis. Total serum LAP varied directly with alkaline phosphatase, SGOT, LDH, creatine phosphokinase, amylase, bilirubin, calcium, inorganic phosphorus, total protein, cephalin flocculation, cholesterol, uric acid, thymol turbidity, γ, β, α, and α_2 globulins.

7149 ENTEROPATHOGENICITY OF *Escherichia coli*. I. EVALUATION OF MOUSE INTESTINAL LOOPS. (E.) Punyashthiti, K. (U. Texas Southwestern Med. Sch., Dallas) and R. A. Finkelstein. *Infect. Immun.* 4(4):473-478, 1971.

This experimental model consisted of 2 isolated 6-cm lengths of small intestine of female white Swiss mice, one of which was injected with the test culture while the other was injected with a control solution. Positive proof of enteropathogenicity in the test loop was a fluid/length ratio of 50 or more. Positive degrees of fluid accumulation to *E. coli* were seen with 19 of 55 strains isolated from diarrheic infants, all of 4 strains from diarrheic adults, and 5 of 7 strains associated with porcine coli bacillosis, but with only 1 of 28 strains isolated from normal humans. *In vitro* hemagglutination of chick RBC was seen *with all* human diarrhea strains and 16 of 19 positive strains from diarrheic children; only a few of the nonenteropathogenic strains gave a positive hemagglutination test.

7150 SECONDARY CHLORIDE-LOSING DIARRHOEA. OBSERVATIONS ON STOOL ELECTROLYTES IN INFANTS AFTER BOWEL SURGERY. (E.) Aaronson, I. (Hosp. Sick Child., London). *Arch. Dis. Child.* 46(248):479-482, 1971.

Although congenital chloride-losing diarrhea is rare, 3 out of 40 infants with postoperative diarrhea had a stool chloride concentration in excess of the total sodium and potassium ion concentration. Each infant had experienced intestinal obstruction and had developed a sugar intolerance. The findings were indicative of an abnormal handling of chloride ion by the bowel. No conclusions could be drawn from serum electrolyt or acid-base studies since balance studies were not done. The mechanism of chloride loss is not clearly understood, but potassium depletion plays a role, since chloride loss is reduced when the alkalosis is corrected by replacing potassium. Diminution in potassium loss as the stool chloride content rises suggests a relationship between the two ions. Adequate potassium replacement should be insured when excessive chloride loss is encountered. Since sugar intolerance was also present, the function of a mucosal enzyme system concerned with chloride transport may become similarly impaired after intestinal obstruction and lead to secondary chloride-losing diarrhea.

7151 A CHALLENGING PROBLEM IN ABDOMINAL PAIN. (E.) Al-Bahrani, Z. R. (U. Baghdad Med. Coll., Iraq) and F. Bakir. *Ann. R. Coll. Surg. Engl.* 49(2):103-113, 1971.

The incidence, clinical features and diagnostic criteria of primary intestinal lymphoma in Iraq are reported. Forty-five cases were seen in a 9-yr period. All 45 patients had abdominal pain, varying in type, site, character and relationship to meals, and most patients had weight loss and anorexia. Vomiting was present in 31 patients and duration of disease ranged from less than 6 months to over a yr. Clubbing of the fingers, abdominal masses and elevated sedimentation rate were common findings. Signs of intestinal obstruction were present in 14 cases and signs of peritonitis in 3. Difficulty of diagnosis can arise during operation, as intestinal lymphoma may simulate other conditions affecting the bowel, such as tuberculosis, duodenal ulcer and Crohn's disease. The response to cyclophosphamide or deep X-ray therapy was of short duration, and in no case proved of real value when surgery failed to eradicate the disease. Laparotomy is the most certain way of diagnosing the condition in addition to being of potential therapeutic value.

7152 DEACTIVATION OF CHOLERA TOXIN BY GANGLIOSIDE. (E.) van Heyningen, W. E., C. C. J. Carpenter, N. F. Pierce (Baltimore Hosp., Md.) and W. B. Greenough, III. *J. Infect. Dis.* 124(4):415-418, 1971.

The effect on the inhibition of the toxin of *Vibrio cholerae* was measured using lipid-containin extracts of rabbit small intestine scraping, liver, kidney, lung, brain and cardiac muscle. The capacity to deactivate cholera toxin as tested in rabbit skin (expressed as μg of material neutralizing 20 blueing doses of toxin) were: homogenates of rabbit liver, kidney, lung and heart, each 25,000 μg; fresh or boiled epithelial scraping from lapine small intestine or brain homogenates, each 500 μg; total lipids of intestinal epithelial scrapings, 100 μg; total lipids of brain, 0.5 μg; lower phase of brain lipids, greater than 20 μg; upper phase of brain lipids, less than 0.1 μg. When purified ganglioside was titrated against cholera toxin, 25 ng deactivated 20 blueing doses of toxin. Ganglioside also deactivated cholera toxin as assayed in the ligated loop of lapine small intestine. When ganglioside was mixed with choleragen and tested in the epididymal fat-cell assay, 1.0 ng of ganglioside shifted the titration curve of choleragen; large amounts of ganglioside increased the requirements of choleragen to stimulate lipolysis.

7153 ENTEROPATHOGENIC Escherichia coli ON THE INTESTINAL MUCOPOLYSACCHARIDE LAYER OF PIGS. (E.) Arbuckle, J. B. R. (Roy. Vet. Coll., Herfordshire, England). *J. Pathol.* 104(2): 93-98, 1971.

The mucinolytic activity of enteropathogenic E. coli from pigs with diarrhea, and E. coli isolated from healthy pigs was investigated. The surface of small-intestinal villi of pigs was covered by a distinct noncellular layer that stained red by periodic acid-Schiff (PAS), blue by alcian blue and colloidal iron. The staining reactions of the goblet cell secretions were similar to those of the surface layer on villi. Methylation of secretions prior to alcian blue staining either prevented or greatly reduced staining of the layer superficial to villous epithelial cells, and was restored with saponification but the goblet cell secretions stained with alcian blue remained after methylation. Periodic acid treatment was necessary in conjunction with Schiff's base to effect any stain of intestinal sections. Pretreatment with saliva had no effect on PAS-positive staining of the superficial villous layer or goblet cell secretions. Intestinal sections from pigs affected with E. coli diarrhea and in which E. coli were adherent to small intestinal villi were alcian blue stained and Gram stained and in neither case could bacterial morphology be distinguished. Colloidal iron allowed some morphological identification. The location of and possible site of proliferation of enteropathogenic E. coli was found on or in the mucopolysaccharide layer covering the small intestinal villi of a pig with post-weaning E. coli diarrhea and was verified with experimentally produced E. coli diarrhea. The relations of E. coli to the mucopolysaccharide layer of the villi could not be distinguished in PAS-stained sections. Although E. coli strains in pigs were found to produce mucinase, no difference in amount of mucinase produced was observed between enteropathogenic or normal E. coli.

7154 NECROTIZING ENTEROCOLITIS OF INFANCY. (E.) Pochaczevsky, R. (Jewish Hosp. Med. Ctr., Brooklyn, N. Y.) and E. G. Kassner. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):283-296, 1971.

Clinical and roentgenographic findings of necrotizing enterocolitis of infancy were reviewed and criteria for its recognition established. Of 196 infants, 86% of cases began in the neonatal period (0-30 days) and prematurity appeared to be the major predisposing factor. Abdominal distention, bile emesis and jaundice were noted in most while rectal bleeding and diarrhea were observed in some of the cases. A frequent complication of necrotizing enterocolitis was bowel perforation. Pneumoperitoneum was the most common roentgenographic finding (60 cases) and pneumatosis intestinalis was reported in 55 cases. Gas in the portal hepatic veins and small intestine distension were also occasionally seen. The presence of pneumatosis on preliminary plain film X-rays is an absolute contraindication to contrast enema examination which is generally not needed to establish the diagnosis. The pneumotosis intestinalis commonly occurring in necrotizing enterocolitis must be differentiated from that occurring in carbohydrate intolerance and its simulation in meconium plug syndrome and in aganglionosis of the colon.

7155 GENETICS AND GASTROENTEROLOGY. (E.) McConnell, R. B. (U. Liverpool Dept. Med., England). *Gut* 12(7):592-598, 1971.

The role of genetic factors in the etiology of various gastrointestinal disorders is reviewed. The relationship between the ABO blood groups and alimentary physiology and the role of these genes on maximal gastric acid output in healthy people are discussed. Studies of hereditary factors influencing the development of hypertrophic pyloric stenosis, Hirschsprung's disease, gastric and duodenal ulcer, Crohn's disease, ulcerative colitis, polyposis and celiac disease are reviewed. The genetic role in the disaccharidase deficiencies, development of gallstones, pancreatitis, and carcinoma of the esophagus is examined. Genetic factors involved in the etiology of hepatic cirrhosis including galactosemia, Wilson's disease, hemochromatosis, and cholestasis are surveyed and the mode of inheritance of hyperbilirubinemias is also described.

7156 RECOGNITION AND ANGIO-SURGICAL DETECTION OF ARTERIOVENOUS MALFORMATIONS OF THE BOWEL. (E.) Alfidi, R. J. (Cleveland

Clin. Found., Ohio), C. D. Esselstyn, R. Tarar, H. J. Klein, R. E. Hermann, F. L. Weakley and R. B. Turnbull, Jr. *Ann. Surg.* 174(4):573-582, 1971.

A method for localizing and removing arteriovenous malformations of the bowel using angiography and laparotomy is described in 12 patients with histories of undiagnosed recurrent gastrointestinal bleeding and anemia. Of the 10 patients who underwent operation following preoperative angiographic demonstration of arteriovenous malformations, 5 had definite histologically diagnosed arteriovenous malformations. In 2 patients intraoperative angiography was used and the lesion able to be localized accurately. In 2 other patients the lesions were shown clearly in pre-operable angiography but no lesion could be detected in the surgical specimen. Bleeding did not recur in either patient following removal of the suspected segment. One patient with normal angiograms and continuous bleeding showed no abnormalities on 3 separate laparotomies and subsequently died. At autopsy many microscopic vascular hamartomata were found in both the small and large intestines. The angiographic-laparotomy technique may be the only effective means of diagnosing, localizing and treating patients with long-standing undiagnosed arteriovenous malformations of the bowel.

7157 EXPERIENCE WITH HEPATIC ARTERIAL INFUSIONS. (E.) Sanderson, T. A. (1005 Hermann Prof. Bldg, Houston, Tex.) and C. M. McBride. *Tex. Med.* 67(3):52-56, 1971.

7158 PREVENTION OF ADHESIONS AFTER SURGERY WITH N-ACETYLAMINO-6-HEXANOIC ACID. (Fr.) Hureau, J. (Vaugirard Hosp., Paris), J. P. Lassau, E. Martin and E. Vairel. *Presse Med.* 79(32):1501-1502, 1971.

7159 COMMENTS ON THE EARLY DEVELOPMENT OF GASTROENTEROLOGY IN THE UNITED STATES OF AMERICA. (E.) Bockus, H. L. (U. Pennsylvania, Dept. Med., Philadelphia). *Perspect. Biol. Med.* 14(2):228-238, 1971.

7160 FISTULAE BETWEEN THE RESPIRATORY AND ALIMENTARY TRACTS IN EARLY INFANCY; DIFFICULTIES IN DIAGNOSIS. (Fr.) Delaitre, R., R. Testard and C. Mignen. *Ouest Med.* 24(8): 789-791, 1971.

7161 HYPERAMMONEMIA AND REPEATED GASTROINTESTINAL BLOOD LOSS IN A 31-YEAR-OLD WOMAN. (E.) Ellis, D. S. (Massachusetts Gen. Hosp., Boston) and W. G. J. Putschar. *N. Engl. J. Med.* 284(20):1145-1152, 1971.

7162 THE ACUTE ABDOMEN. (Ger.) Cadalbert, M. (Univ. Surg. Clin. A. Zurich, Switzerland). *Monatskurse Aerztl. Fortbild* 21(3):124-127, 1971.

7163 COMPARISON OF PHAGOCYTIC AND PHOSPHATASE ACTIVITY OF LEUKOCYTES IN ACUTE DYSENTERY. (Rus.) Belogurova, A. F. *Sov. Med.* 34(6):130-131, 1971.

7164 ABDOMINAL SARCOIDOSIS WITH ASCITES. (E.) Papowitz, A. J. (Montefiore Morrisania Hosp., Bronx, N. Y.) and J. K. H. Li. *Chest* 59(6):692-695, 1971.

7165 SOME CURRENT PROBLEMS IN EPIDEMIOLOGY OF DYSENTERY, SALMONELLOSIS AND VIRAL HEPATITIS. (Ser.) Birtasevic, B. *Vojnosanit. Pregl.* 28(3):145-148, 1971.

7166 ALIMENTARY TRACT INTOLERANCE OF ANTI-INFLAMMATORY PREPARATIONS RECENTLY INTRODUCED INTO RHEUMATOLOGY. (Fr.) Cabanel, G., F. Jacquot, J. M. Verdier and X. Phelip. *Rhumatologie* 23(6):207-218, 1971.

7167 MESENTERIC CYST SIMULATING ASCITES. (Ger.) Mortensson, W. (Univ. Clin., Lund, Sweden). *Radiologe* 11(2):54-55, 1971.

7168 USE OF GNOTOBIOTIC PIGS FOR RESEARCH ON ENTERITIS ASSOCIATED WITH ESCHERICHIA COLI. (E.) Kenworthy, R. (Unilever Res. Lab., Bedford, England). *Proc. R. Soc. Med.* 64(4): 436-439, 1971.

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	min	minute(s)
ADP	adenosine diphosphate	ml	milliliter(s)
AMP	adenosine monophosphate	mm	millimeter(s)
ATP	adenosine triphosphate	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotanamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotide phosphate
CNS	central nervous system	NADPH	reduced nicotinamide adenine dinucleotide phosphate
cpm	counts per minute	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	pg	picogram (10^{-12})
e.g.	for example	p.o.	orally
g	gram(s)	ppm	parts per million
µg	microgram(s)	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
i.m.	intramuscular	resp.	respectively
i.p.	intraperitoneal	Rev.	review (only in citations)
IU	international unit(s)	RNA	ribonucleic acid
i.v.	intravenous	s.c.	subcutaneous
kg	kilogram(s)	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase	SGPT	serum glutamic-pyruvic transaminase
m	meter(s)	U	unit(s)
M	molar	UV	ultraviolet
mEq	milliequivalent(s)	WBC	white blood cells (leukocytes), white blood count
mM	millimolar	yr	year(s)
µM	micromolar		
mC,µC	milli-,microcurie(s)		
mg	milligram(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7204 AN ELECTRON MICROSCOPIC STUDY OF ENDOGENOUS VERY LOW DENSITY LIPOPROTEIN PRODUCTION IN THE INTESTINE OF RAT AND MAN. (E.) Jones, A. L. (U. California Med. Ctr., San Francisco) and R. K. Ockner. *J. Lipid Res.* 12(5):580-589, 1971.

After 48 hr of fasting, particles of very-low-density lipoproteins (VLDL; 300-800 Å) were found in most absorptive cells of the small intestine, within the cisternae of the endoplasmic reticulum, and in intercellular spaces between adjacent epithelial cells. Both intracellular and extracellular VLDL particles were far more numerous in the mid-jejunum than in other regions of the small intestine. Similar results were found in jejunal biopsies from 4 human volunteers after 40 hr fasting, but VLDL particles were also foumd in the Golgi apparatus and within the lacteals and tubules of the smooth-surfaced endoplasmic reticulum. The greatest accumulation of VLDL particles was in the proximal jejunum; these particles were not as electron-dense as those in the rat, suggesting that there may be differences between the lipid composition of VLDL in man and the rat. In rats diversion of bile and administration of cholestyramine (80 mg/hr infused intraduodenally for 6 hr) resulted in the disappearance of VLDL particles from the small intestine. This was most striking in animals after bile diversion. These findings provide further support for the hypothesis that VLDL is produced in absorptive cells of fasting rat and human intestine and that the small intestine is a source of endogenous plasma VLDL.

7205 EFFECT OF INTRA-ARTERIAL CONTRAST MEDIA ON THE SMALL INTESTINE OF RATS. A PRELIMINARY REPORT OF AN ELECTRON MICROSCOPE STUDY. (E.) Moss, A. A. (U. California Sch. Med., San Francisco), A. R. Margulis, J. E. Youker, J. C. Lee and J. A. Stoughton. *Invest. Radiol.* 6(6):392-401, 1971.

The superior mesenteric artery of anesthetized rats was cannulated and injected rapidly with 1 ml of a control substance (saline or Ringer's lactate) or one of several contrast media diatriazote methylglucamine, Na ditriazoate, Na metrizoate, iodipamide, or an experimental diatriazote compound. In controls, light and electron microscopy showed no abnormalities of vessels or epithelial cells of small intestinal villi. In experimental rats there was intracellular edema, occasional necrosis near the tips of microvilli and vacuolization of epithelial cells. Leukocytes were occasionally noted in the mesenteric fat, but the capillary endothelium was normal. By electron microscopy structural changes consisted of cytoplasmic vacuolization of the smooth endoplasmic reticulum, swelling of the mitochondria, swelling and shortening of the microvilli, and intercellular space widening, presumably secondary to intercellular edema. Abnormalities were most severe with iodipamide, while diatriazoate methylglucamide produced a greater degree of intracellular space widening. Most of the changes observed at 30 min after injection had resolved by 24 hours.

7206 ADRENERGIC INNERVATION OF THE ALIMENTARY CANAL. (E.) Costa, M. (U. Turin Dept. Human Anat., Italy) and G. Gabella. *Z. Zellforsch. Mikrosk. Anat.* 122(3):357-377, 1971.

The distribution of the adrenergic fibers in all layers of the subdiaphragmatic digestive tract of the rabbit, rat and guinea pig was studied histochemically. Most adrenergic fibers were found in Auerbach's and Meissner's plexuses, within the circular muscle, around the basis of mucosal glands and in the perivascular plexuses of the gastrointestinal tract. The distribution of adrenergic fibers within the ganglia of Auerbach's plexus was quite similar in the different parts of the alimentary canal. Contrary to previous reports, adrenergic nerve fibers were found to innervate the circular muscle of all parts of the gastrointestinal tract. Adrenergic nerves may affect gastrointestinal motility by their action on intramural ganglia and by a direct action on the muscle. Varicose adrenergic fibers running for considerable distances in Auerbach's plexus were often not associated with ganglion cells. Norepinephrine release from varicosities along the terminal part of the axon could be expected to expose most of the ganglion cells of the plexus to norepinephrine and also to provide for the overflow of norepinephrine to the muscle. Although fluorescent cells in Auerbach's plexus of the cat duodenum were not observed, adrenergic nerve cells in the wall were seen when diffusion of fluorescent products occurred. In the cardiac and the anal sphincters there was an exceedingly dense innervation of longitudinal and circular muscle.

7207 THE EFFECTS OF CORTISOL AND BUDR ON CELLULAR DIFFERENTIATION IN THE SMALL INTESTINE IN SUCKLING RATS. (E.) Clark, S. L., Jr. (U. Massachusetts Sch. Med., Worcester). *Am. J. Anat.* 132(3):319-337, 1971.

Suckling albino rats were injected with cortisol phosphate (12-18 mg/100 g body weight, s.c.) or 5-bromodeoxyuridine (BUDR; 5-33 mg/100 g, i.p.), or both or neither. Three days later they received an intra-esophageal instillation of Evans blue in saline and were sacrificed 4-5 hr later. Pinocytosis by intestinal absorptive cells which were already present was not altered by cortisol, but replacement villous cells did not engage in pinocytosis. The effect of cortisol on intestinal pinocytosis was negated by simultaneous administration of BUDR.

7208 EFFECT OF ACTINOMYCIN D ON THE SUBMICROSCOPIC STRUCTURE OF THE EXOCRINE CELLS OF THE ADULT RAT PANCREAS. (E.) Horký, D. (Purkyne U. Fac. Med., Brno, Czechoslovakia) and J. Toman. *Folia Morphol. (Praha)* 19(1):51-57, 1971.

Adult white female laboratory rats received i.p. injections of 0.05, 0.2, 0.6 or 0.8 mg of actinomycin D (AD), and sacrificed 15 hr later. The pancreases were prepared for electron microscopic examination of the exocrine structure. The dose of 0.05 mg AD caused the formation of ring-shaped nucleoli, with most of the nucleolar material in the periphery. After 0.2 mg AD, there were either ring-shaped or compact nucleoli. There was also rupture of the membrane of the prozymogen granules and fusion of the granules. With 0.6 and, to a greater extent, 0.8 mg AD, there was formation of small, compact nuclei, with concentration of the chromatin at only 1 or 2 sites within the nucleus. There was a great increase in the spaces inside the granular endoplasmic reticulum and in the number of autophagic vacuoles. The appearance of the secretory granules after 0.6 or 0.8 mg was the same as that after 0.2 mg AD. The Golgi apparatus was now seldom seen.

7209 CELLULARITY OF ADIPOSE DEPOTS IN THE GENETICALLY OBESE ZUCKER RAT. (E.) Johnson, P. R. (Rockefeller U., New York, N. Y.), L. M. Zucker, J. A. F. Cruce and J. Hirsch. *J. Lipid Res.* 12(6):706-714, 1971.

A comparison is made of the changes in adipose tissue cellularity that occur during growth and development of the Zucker fat rat and its lean littermate. The adult Zucker rat was compared with Zucker lean controls and the lean littermate made obese by hypothalamic lesion. Lipid percentage continued to increase at weaning in the obese Zucker rat, in contrast to the normal, and both cell size and number increased during growth to a much greater extent than in the normal. In contrast to the normal controls, cell number in the obese Zucker rat did not stabilize around 14 weeks but continued to rise throughout the observation period. Also the adult obese Zucker rat had cells of the same size in all 3 adipose depots studies, as compared to controls. Tibial length measurements confirmed the earlier reports that the obese Zucker rat had a smaller skeleton than its normal littermate. Ventromedial hypothalamically (VMH)-lesioned Zucker rats showed no growth depression. However, they developed adiposity in the retroperitoneal and gonadal sites comparable to that seen in the Zucker, but the lipid deposited s.c. was not of the magnitude seen in the Zucker rat. At weaning, there was a decrease in percentage of lipid for the retroperitoneal and subcutaneous pads as well as for the whole body. Both cell size and number increased during post-weaning growth. The depot enlargement at all 3 sites in the VMH-lesioned Zucker rat was clearly the result of cell enlargement. Obesity produced by hypothalamic lesioning was therefore very different from the genetic obesity seen in the Zucker rat.

7210 THE ENDOCRINE CELLS IN THE HUMAN COLON AND RECTUM. AN ELECTRON MICROSCOPE STUDY OF BIOPSY MATERIALS. (E.) Osaka, M. (Niigata U. Sch. Med., Japan), T. Sasagawa, S. Kobayashi and T. Fujita. *Nippon Soshikigaku Kiroku (Arch. Histol. Jap.)* 33(3):247-260, 1971.

Biopsy specimens were taken from areas of normal colon and rectum in 13 patients with various gastrointestinal diseases using a colonofiberscope, and observed electron microscopically for endocrine cells. Two types of basal-granulated cells were differentiated on the basis of the structure of the specific granules accumulated toward the base of the cell. One was characterized by very electron-dense granules of irregular shape and was easily identified with the enterochromaffin cells which occur widely in the gastrointestinal mucosa. The other type had round basal granules of lower, but considerable, electron density. The homogeneous substance of the granules was tightly encircled by a smooth membrane sac. In both types of cells small granules, presumably in an immature stage, were found in the vesicles of the Golgi apparatus. Cisterns of granular endoplasmic reticulum and mitochondria with mostly ovoid profiles were dispersed in moderate numbers throughout the cytoplasm. Inconspicuous masses of a filamentous substance sometimes occurred among the granules and organelles. In the colon all of the endocrine cells may reach the luminal surface with a cytoplasmic process, however, in the rectum some of these cells may lack an apical process.

7211 INTRANUCLEAR INCLUSIONS IN ENDOCRINE CELLS OF THE RABBIT STOMACH. (Ger.) Muller, O. (U. Graz Inst. Pathol., Austria) and M. Ratzenhofer. *Z. Zellforsch. Mikrosk. Anat.* 117(4):526-536, 1971.

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7213 A STUDY OF FIBROBLAST LIKE CELLS IN MONOSTRATAL CULTURES OF MOUSE EMBRYO

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7221 A STUDY OF THE CELL NUCLEOLUS IN MICE. II. THE RELATIONSHIP BETWEEN THE NUMBER AND SIZE OF NUCLEOLI IN LIVER CELLS. (E.) Ivanyi, D. (Inst. Dent. Res., Prague) and L. Mrklas. *Folia Biol. (Praha)* 17(3):171-174, 1971.

7222 SITE OF ACTION OF PEPTIDASE IN THE CELLS OF SMALL INTESTINE EPITHELIUM OF MAMMALS, BIRDS, AND FISHES OF DIVERSE AGE. (Rus.) Kooshuck, R. J. (Inst. Biol., Riga, USSR). *Fiziol. Zh. SSSR* 57(7):1053-1057, 1971.

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7226 RELATIONSHIP BETWEEN THE HISTOLOGIC PICTURE OF THE GASTRIC MUCOSA AND THE SECRETORY ACTIVITY IN MAN. (Hun.) Varro, V. (Szeged Med. U., Hungary), G. Karacsony and E. Pach. *Kiserl. Orvostud.* 23(3):321-326, 1971.

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7234 DIFFERENTIATION OF ENDOPLASMIC RETICULUM IN HEPATOCYTES. I. GLUCOSE 6 PHOSPHATASE DISTRIBUTION IN SITU. (E.) Leskes, A. (Rockefeller U., New York, N. Y.), P. Siekevitz and G. E. Palade. *J. Cell Biol.* 49(2): 264-287, 1971.

7235 DIHYDROURACIL DEHYDROGENASE OF RAT LIVER. SEPARATION OF HYDROGENASE AND DEHYDROGENASE ACTIVITIES. (E.) Smith, A. E. (U. Manitoba Dept. Biochem., Winnipeg, Canada) and E. W. Yamada. *J. Biol. Chem.* 246(11):3610-3617, 1971.

See also numbers: 7295, 7297, 7305, 7313, 7454, 7655, 7911

7236 NORMAL AND PROMOTED GI ABSORPTION OF WATER-SOLUBLE SUBSTANCES II: ABSORPTION OF VITAMIN B_{12} FROM LIGATED STOMACH AND INTACT INTESTINE OF THE RAT. (E.) Davis, W. W. (Lilly Res. Labs., Indianapolis, Ind.) and C. J. Kreutler. *J. Pharm. Sci.* 60(11):1651-1654, 1971.

In the absence of an absorption promoter, polyoxyethylene-20-oleyl ether (a nonionic surface-active agent), the absorption of ^{57}Co-vitamin B_{12} was extremely limited with gastric-ligated rats, while in the presence of the promoter much more absorption occurred. Both with and without promoter, increased doses of the vitamin (400, 2000, and 60000 ng/rat) resulted in a proportionate increase in absorption at the higher concentrations, while less than proportionate absorption occurred at the lowest dose level. Experiments with intact rats showed increased absorption and accumulation over normal in the presence of promoter. After 2 hr, accumulation of the vitamin was greater in the liver than kidney, whereas the kidney later showed more accumulation than the liver. With increased doses of vitamin B12, the percent of the dose absorbed by the normal intrinsic factor-assisted process diminished. This decreased normal absorption efficiency was most marked in going from the lowest to the intermediate dose. However, with promoter present, absorption reached a constant efficiency as the concentration of vitamin B12 increased, but was lower overall than in the intrinsic factor-assisted process at the lowest vitamin B_{12} dose. With high doses of vitamin B_{12} the limiting efficiency of absorption in the presence of the promoter was higher than in its absence. At low vitamin B_{12} concentrations, the efficiency of normal absorption was equal in fasted and fed animals while feeding lowered the normal absorption at high vitamin concentrations. With promoter, no difference in absorption was observed between fasted and fed animals at low or high vitamin concentrations. These results are seemingly similar to the action of surface active absorption promoters on the absorption of other water-soluble substances.

7237 COMPARATIVE STUDIES ON THE ADSORPTION OF VITAMIN B_{12} TO INTESTINAL MUCOSA HOMOGENATE OF ADULT AND UNWEANED RATS. (E.) Yamada, S. (Tohoku U. Fac. Agric., Sendai, Japan), Y. Yokoyama and S. Kimura. *Tohoku J. Exp. Med.* 104(3):215-223, 1971.

In the adult rat, more vitamin B_{12} was adsorbed to an intestinal preparation with its serosa than to intestinal mucosa alone. However, the presence of intestinal serosa did not affect the enhancement of vitamin B_{12} adsorption by the addition of gastric mucosa preparations. The vitamin B_{12} binding capacity of the gastric preparations from the unweaned rat was 1/27 of those from the adult rat and increased in proportion to the increased addition of the gastric mucosa preparations up to 4.4 mg/100 g body weight of rat. Adsorption of vitamin B_{12} to the intestinal preparations of the unweaned rat or the adult rat was not affected by the addition of the gastric preparations of the unweaned rat. The amount of vitamin B_{12} adsorbed to the intestine of the unweaned rat without gastric preparations was 4-10 times larger than that to the intestinal preparations of the adult rat with gastric preparations from the adult rat. Histologic studies in the adult rat gastric gland showed a large number of chief cells which were seen not to contain granules and so would not be able to secrete intrinsic factor and pepsinogen normally. In the adult rat system, adsorption of vitamin B_{12} was dependent on the presence of bivalent cations, the effect of lack of Ca^{++} was more pronounced than lack of Mg^{++} ion. However, in the unweaned rat system, lack of Ca^{++} had little effect in the adsorption of the vitamin while lack of Mg^{++} decreased the amount of vitamin B_{12} adsorbed. No difference in initial velocity of and time required to reach maximal value of vitamin B_{12} adsorption was found in adult and unweaned rats. In unweaned rats a high value was maintained for a long period, while in adult rats the rate decreased immediately after the maximum value was reached. Reincubation in saline added with EDTA-2Na caused the release of small amounts of vitamin B_{12} in the unweaned rat system and large amounts in the adult rat system.

7238 THE EFFECTS OF SYNTHETIC SURFACTANTS ON INTESTINAL PERMEABILITY TO GLUCOSE IN VITRO. (E.) Moore, J. D. (Parkland Mem. Hosp., Dallas, Tex.), M. L. Satzman and D. E. Overack. *Proc. Soc. Exp. Biol. Med.* 137(4):1135-1139, 1971.

The phlorhizin concentration used was sufficient to prevent an uptake of glucose in everted small intestine of hamsters against a concentration gradient. Segments exposed to linear alkylate sulfonate and ethyltrimethylammonium bromide at concentrations of 25 and 50 ppm, resp., exhibited an increased passive glucose transfer rate. Triton and alkylbenzenesulfonate did not produce an increase in permeability until concentrations of 250 ppm were attained. High levels of anionic and cationic surfactants produced gross tissue alterations which were observed microscopically. The abnormalities noted were irregular striated borders of the mucosal epithelium, with the suggestion of loosening of intercellular junctions. All surfactants tested produced intestinal permeability changes at levels lower than the critical micellar concentration. Increased glucose permeability could account, in part, for decreased glucose uptake by the intestine when exposed to detergents due to the production of a leak at the mucosal surface preventing the establishment of a glucose gradient between the mucosal cell and the serosal border.

7239 ABSORPTION AND METABOLISM OF D(-) FRUCTOSE IN MAN. (E.) Cook, G. C. (Royal Free Hosp., London). *Am. J. Clin. Nutr.* 24(11):1302-1307, 1971.

Ten patients with cirrhosis, 5 of whom had ischemic heart disease, and 19 with no evidence of liver disease, were fasted overnight (10-12 hr. All received fructose p.o. and 16 also received glucose p.o. Capillary blood glucose and fructose and venous blood pyruvate, lactate and insulin levels were measured at zero time and for 120 min after sugar ingestion. There was no significant difference in absorption products of fructose in the different groups. Blood glucose and insulin curves after fructose were similar in all subjects and both were significantly flatter than those after glucose. Blood pyruvate and lactate levels were similar in all subjects after fructose but were significantly higher and with greater scatter than after glucose. The mean blood fructose curves were highest in patients with portal-systemic shunts as demonstrated by abdominal collateral vessels, from which samples were also analyzed.

7240 STUDIES OF THE ABSORPTION FUNCTION OF EXPERIMENTALLY TRANSPLANTED INTESTINE IN DOGS. (Jap.) Tanimoto, K. (Tokushima U. Sch. Med., Japan). *Shikoku Igaku Zasshi (Shikoku Acta Med.)* 27(1):16-38, 1971.

Dogs were given heterotopic auto- and homografts of ileal segments in the neck region as Thiry-Vella fistulas. Mesenteric vessels were anastomosed to the carotid artery and jugular vein. Immediately after transplantation, the absorption curves for ^{131}I-oleic acid in the autograft and homograft were almost identical. However, on the fourth postoperative day, the absorption rate of the homograft was significantly lower. The absorption function of the autograft increased progressively up to the third week, after which it declined slowly, but it was maintained up to the tenth month. Lowered absorption was consistent with histological evidence of intestinal atrophy. The absorption curves for ^{32}P and Na^{131}I in homografts and autografts remained similar up to the fourth day. However, the absorption of ^{32}P and Na^{131}I in the homografts was maintained longer than that of ^{131}I-oleic acid, due to the difference in absorption mechanism. By the thirteenth day, absorption was significantly lower in the homografts treated with immunosuppressive agents (azathioprine and dexamethasone). The longest survival of a homograft was 21 days.

7241 ION TRANSPORT IN RABBIT ILEAL MUCOSA. II. EFFECTS OF CYCLIC 3',5'-AMP. (E.) Field, M. (Harvard Med. Sch., Boston, Mass.). *Am. J. Physiol.* 221(4):992-997, 1971.

Cyclic AMP stimulates an active secretory process in rabbit ileal mucosa manifested by the appearance of a net Cl flux from serosa (S) to mucosa (M) and the disappearance of organic solute-independent net M-to-S Na flux. Increased short-circuit (SCC) was produced by addition of cyclic AMP, dibutyryl cyclic AMP, or theophylline to the serosal side of isolated rabbit ileal mucosa; maximal increment was 80 microamperes/cm^2 for all 3 agents; half-maximal concentrations were 3 x 10^{-3} M, 8 x 10^{-5} M, and 7 x 10^{-4}, resp. The net M-to-S Na flux disappeared 30-60 min after theophylline (10mM) or cyclic AMP (7.5 mM) addition to the short-circuited mucosa, and net Cl flux was reversed in direction from M-to-S to S-to-M due to decrease in M-to-S and increase in S-to-M unidirectional fluxes. Cyclic AMP did not inhibit glucose-coupled Na transport. Glucose addition on the luminal side caused the same increment in SCC in theophylline-treated as in control tissues. ATP, uridine triphosphate, ADD, 5'AMP, cyclic guanosine monophosphate and pyrophosphate all increase SCC on the serosal side. Prior addition of theophylline reduced SCC responses suggesting a common mode of action. Several of these agents inhibit phosphodiesterase in other tissues.

7242 EFFECT OF AMINOPTERIN ON LIPID ABSORPTION: DEPRESSION OF LIPID-REESTERIFYING ENZYMES. (E.) Fromm, H. (Albany Med. Coll., N. Y.) and J. B. Rodgers, Jr. *Am. J. Physiol.* 221(4):998-1003, 1971.

Lipid absorption after the i.m. administration of aminopterin (250 mg/100 g) was investigated. Aminopterin produced abnormal intracellular function of the rat small intestinal mucosa resulting in malabsorption of lipid. Assay of lipid-reesterifying enzymes in the microsomal fraction of jejunal mucosa showed reduction of enzyme activity on the third day after completion of drug treatment. Absorption of a micellar lipid solution using the everted gut sac-technique was investigated. The finding of greater amounts of radioactive lipid in the sacs from drug-treated rats suggested that aminopterin blocked reesterification. Absorption of a triglyceride emulsion in thoracic duct-cannulated rats showed abnormal absorption and esterification of oleic acid-^{14}C by everted sacs. In vivo studies of lipid absorption on the third day after aminopteri confirmed the observations made by in vitro studies.

7243 EFFECTS OF DIETARY COMPONENTS ON GI ABSORPTION OF ACETAMINOPHEN TABLETS IN MAN. (E.) Jaffe, J. M., J. L. Colaizzi (U. Pittsburgh Dept. Pharm., Pa.) and H. Barry, III. *J. Pharm. Sci.* 60(11):1646-1650, 1971.

The effects of high carbohydrate, high protein, and high lipid test meals on the absorption of p.o. administered acetaminophen tablets in normal human subjects. Balanced test meals and fasting were also used. Absorption rate and extent of acetaminophen was evaluated by measuring the excretion of the drug at 90-min intervals for 9 hr. The carbohydrate test conditions decreased the amount of acetaminophen excreted initially followed by a compensatory increase at later time intervals and these effects were significantly different from the results of the balanced test meals. Very little difference in acetaminophen excretion values were found in each time interval among the protein, lipid, balanced and fasting conditions. Three different high carbohydrate test conditions consisting of marshmallows, crackers and jelly were compared. After 90 min, the highest amount of acetaminophen was excreted by the group fed on marshmallows while the lowest amount was found in the jelly-fed group. Nine-hour cumulative excretion of acetaminophen was highest again in the group eating marshmallows and was lowest in those fed on crackers. Low and high pectin (a component of the carbohydrate-jelly test meals) test conditions were compared with a fasting condition and showed that acetaminophen excretion was depressed after high pectin treatment initially and elevated in later time periods. Acetaminophen absorption may be inhibited by interacting with the pectin present in the carbohydrate test meals.

7244 THE MODE OF TELEPAQUE ABSORPTION FROM THE INTESTINE. (E.) Reinke, R. T. (U. California San Diego Sch. Med.) and R. N. Berk. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(3):578-581, 1971.

To determine whether iopanoic acid is absorbed from the intestine through the portal venous system or into the intestinal lymphatics, in vivo and in vitro dialysis experiments were performed on Sprague Dawley rats which usually contain only 1 intestinal lymph duct. Blood concentration of iopanoic acid was greater than the lymph concentration during the first 1.5-3 hr after both the rapid injection and slow infusion into the intestine. When ^{125}I iopanoic acid was injected intra-arterially or given by i.v. infusion it appeared in the intestinal lymph and indicated that back-diffusion occurred from the blood since the lymph concentration after iopanoic acid was injected or infused into the intestine was the same after intra-arterial or i.v. infusion. In animals with and without bile duct cannulation and to which iopanoic acid was injected into the gut, the possibility of a rapid turnover of a pool of conjugated iopanoic acid that contributed to the iopanoic acid in the blood and lymph was ruled out since in both groups of rats the results were the same. Lymph and whole blood dialyzed against Tris-buffered ^{125}I iopanoic acid showed that about 1.5-2 times more iopanoic acid appeared in the blood than in the lymph. The cpm/ml of iopanoic acid closely paralleled the albumin concentration and suggested that the increased binding in blood was related to its higher albumin concentration. There was no difference in the binding capacity of triglyceride-poor and triglyceride-rich lymph which indicated that the chylomicrons in the triglyceride-rich lymph play no part in iopanoic acid binding. Iopanoic acid reaches the systemic circulation through the portal venous system due to its much higher flow rate and the blood's increased capacity to bind telepaque as compared to the intestinal lymphatics.

7245 DRUG ABSORPTION V: INFLUENCE OF FOOD ON ORAL ABSORPTION OF PHENOBARBITAL IN RATS. (E.) Kojima, S. (Kumamoto U. Fac. Pharm. Sci., Japan), R. B. Smith and J. T. Doluisio. *J. Pharm. Sci.* 60(11):1639-1641, 1971.

For a 100 mg/kg dose of phenobarbital, fasted rats had an average onset time of 28 min and an average duration of action of 227 min; however, the same dose in nonfasted rats produced no hypnotic effect (righting reflex was not absent). The presence of food concomitant to p.o. administration of phenobarbital delayed the attainment and decreased the magnitude of the maximum serum level. The percent of phenobarbital (100 mg/kg) remaining to be absorbed at 1 hr was 4.5% in fasted rats compared to 26% in nonfasted rats. The rate of absorption of phenobarbital was much greater in the intestine at pH 6.0 than in the stomach at pH 3.0. More than 90% of the drug remaining to be absorbed at any given time was contained in the stomach in both fasted and nonfasted rats. The presence of food altered absorption, primarily by delaying stomach emptying and hence increasing the time for the drug to reach its primary absorption site. Since the drug is rapidly absorbed in the intestine, the extent of absorption is the same in the nonfasted rat as in the fasted rat. In man, if a second dose is self administered, there is a significant hazard of intoxication due to a delayed onset of action.

7246 INTESTINAL TRANSPORT OF DIPEPTIDES IN MAN: RELATIVE IMPORTANCE OF HYDROLYSIS AND INTACT ABSORPTION. (E.) Adibi, S. A. (U. Pittsburgh Sch. Med., Pa.). *J. Clin. Invest.* 50(11):2266-2275, 1971.

Normal male volunteers were intubated with a double-lumened tube (with a 30-cm distance between the perfusion opening and the aspiration opening) with the aspiration opening positioned at 80, 120 or 200 cm from the teeth for perfusion studies in the duodenum, jejunum and ileum, resp. The next day, intestinal segments were perfused with either glycylglycine (10, 20, 25 or 50 mM); glycine (20, 50 or 100 mM); glycyl-L-leucine (20, 50 or 100 mM); glycylglycine (50 mM) plus L-leucine (50 or 100 mM); glycine plus L-leucine (in equi-molar mixtures of 20, 50 and 100 mM); glycyl-L-leucine (20 or 50 mM) plus L-isoleucine (50 mM). In luminal fluid there was no hydrolytic activity against glycylglycine and minimal activity against glycylleucine. Within each segment there was greater absorption of amino acids from solutions containing the same amount of amino acids in dipeptide than in free form. With perfusion of equimolar glycine and leucine, the absorption of leucine was always greater than that of glycine, but this preferential absorption of leucine was diminished (jejunum) or almost abolished (duodenum and ileum) with use of glycylleucine. Peptide disappearance was least in the duodenum and absorption rates of constituent amino acids were greater in the jejunum than in the ileum, and this was accompanied by a 3 to 10-fold greater concentration of free amino acids in the ileal lumen. These results suggest that disappearance of dipeptides from the lumen is by intact absorption instead of hydrolysis.

7247 THE MECHANISM OF DECREASED INTESTINAL SODIUM AND WATER ABSORPTION AFTER ACUTE VOLUME EXPANSION IN THE RAT.

(E.) Humphreys, M. H. (U. California Cardiovasc. Res. Inst., San Francisco) and L. E. Earley. *J. Clin. Invest.* 50(11):2355-2367, 1971.

Male Sprague-Dawley rats were prepared with 10 cm in vivo perfusion segments of either proximal jejunum or distal ileum. With i.v. infusion of saline there was a decrease in the net flux of Na$^+$ in both segments when they were being perfused with Na$^+$ and glucose or mannitol. With substitution of choline for Na$^+$ in the perfusion medium there was a net secretion of Na$^+$ from blood into the intestinal segments. After saline infusion, the permeability of intestinal mucosa was increased 5-fold and the unidirectional flux of Na$^+$ from blood into lumen 2-fold, and this increase in unidirectional flux of Na$^+$ was greater than the decrease in net Na$^+$ flux. It is concluded that the effect of saline infusion on intestinal absorption may be due either to an increase in passive epithelial permeability which might disrupt solute gradients within the membrane, or to an increase in flow of solution into the lumen.

7248 COMPETITIVE NATURE OF THE INTESTINAL TRANSPORT MECHANISM FOR COBALT AND IRON IN THE RAT.

(E.) Thomson, A. B. R. (Queens U. Dept. Med., Kingston, Ontario, Canada), L. S. Valberg and D. G. Sinclair. *J. Clin. Invest.* 50(11):2384-2394, 1971.

Iron deficiency was induced in a group of albino rats by raising them on a semisynthetic diet containing 10 mg/kg of iron; iron overload was induced in another group by supplementing the diet with 150 mg/kg of iron and injection of 15 mg of iron i.m. on the 28th day. Studies of duodenal absorption were carried out at 60 and 90 days of age. When the duodenum was perfused with solutions containing 5 millimoles of either iron or cobalt, in iron-overloaded rats the rate of absorption of cobalt was constant during the 90-min perfusion period, while the rate of iron absorption decreased after 30 min. In iron-deficient rats there was increased absorption of both iron and cobalt and this was greater during the initial 30 min than during the ensuing hr. Using a 30-min perfusion of duodenal loops with 0.1-10.0 millimoles of either metal, the absorption was dose-dependent in both iron-deficient and iron-overloaded rats. With simultaneous perfusion of both metals in iron-deficient rats, each one competitively inhibited the absorption of the other. Both metals exhibited a similar maximum transport velocity, but the affinity for cobalt was greater than that for iron.

7249 SELECTIVE PERMEABILITY OF THE SMALL INTESTINE FOR FRUCTOSE.

(E.) Guy, M. J. (Maimonides Med. Ctr., Brooklyn, N. Y.) and J. J. Deren. *Am. J. Physiol.* 221(4):1051-1056, 1971.

The mechanism of fructose absorption by intestinal epithelial cells was studied in vitro using rat intestinal rings. The addition of phlorhizin (5 x 10^{-4}M), D-glucose (10^{-2}M) or L-sorbose to, or the absence of Na$^+$ from the circulation medium did not impair the rate of fructose entry into rat intestinal rings. While fructose uptake was slower than galactose or 3-O-methylglucose, its rate of entry into the cells exceeded that of L-sorbose. Phlorhizin markedly depressed the rate of 3-O-methylglucose and galactose absorption, thus the rate of entry of fructose was faster. In phlorhizin-treated rabbit ileal segments, fructose entered the epithelial cell at a rate substantially greater than D-galactose, D-mannose and L-sorbose. Fructose entered the cells at a faster rate than ribose and xylose and was unaffected by the addition of L-sorbose, 3-O-methylglucose, or 5-ketafructose. Thus, the intestinal epithelial cells may have a special membrane mechanism that allows for the rapid entry of fructose.

7250 ETHYLENEDIAMINETETRAACETIC ACID AND ^{65}Zn BINDING BY INTESTINAL DIGESTA, INTESTINAL MUCOSA AND BLOOD PLASMA.

(E.) Suso, F. A. (U. Georgia Coll. Agric., Athens) and H. M. Edwards, Jr. *Proc. Soc. Exp. Biol. Med.* 138(1):157-162, 1971.

The mechanics involved in the ethylenediaminetetraacetic acid (EDTA) enhancement of zinc absorption was studied in the intestinal digesta and mucosa, and blood plasma levels of White Leghorn chickens. The dialytic pattern of Zn in all the samples was not altered by the presence of EDTA in the diet of the chickens. Dialysis removed less than 5% of the ^{65}Zn and EDTA-^{14}C present in blood plasma, 30% from the mucosal soluble fraction and 85% that was present in the intestinal digesta preparation and indicated that no large molecule was binding the element in the intestinal digesta. Gel filtration of the intestinal digesta revealed 2 major peaks; one indicated a high molecular weight polypeptide while the second was of a low molecular weight and appeared to contain free amino acids. When

EDTA-^{14}C was given to chickens fed on 0.125% EDTA, ^{65}Zn was displaced in the intestinal digesta from its position next to the free amino acids and was present together with the EDTA-^{14}C, indicating binding of ^{65}Zn to EDTA-^{14}C. In the intestinal mucosa the ^{65}Zn-EDTA-^{14}C complex was bound to a Zn-binding protein, with a molecular weight of 14,000-18,000, regardless of the presence of EDTA in the diet. However, ^{65}Zn-EDTA-^{14}C in the blood plasma was bound to a plasma protein, with a molecular weight of 65,000-70,000, that had a greater affinity for zinc than the zinc-binding protein present in the intestinal mucosa. Ratios of EDTA-^{14}C:^{65}Zn in the main peaks eluted by gel-filtration in each of the 3 fractions indicated strong binding of the EDTA-Zinc complex.

7251 BACTERIA, BILE SALTS, AND INTESTINAL MONOSACCHARIDE MALABSORPTION. (E.) Gracey, M. (Princess Margaret Hosp. Res. Found., Perth, Australia), V. Burke, A. Oshin, J. Barker and E. F. Glasgow. *Gut* 12(9):683-692, 1971.

The hypothesis that bacterial overgrowth and subsequent deconjugation of bile salts in the upper small intestine results in impaired monosaccharide absorption was studied in rats with a self-filling jejunal blind loop. Using 3 mM arbutin (p-hydroxyphenyl-B-glucoside) as substrate, the mean uptake in vitro was less in all segments from blind-loop animals as compared to controls. The substrate 1 mM D-fructose the rate of uptake was less than controls in all 3 areas from the blind-loop animals. With 10 mM arbutin and 5 mM D-fructose in vivo, blind-loop animals transported less than controls with the decrease in arbutin transport being greatest in the blind-loop, less in the efferent jejunum and relatively normal transport in the afferent jejunum. In all 3 areas from blind-loop animals there was an increase in both aerobes and anaerobes with the most luxuriant flora being in the blind-loops. All 3 areas studied in blind-loop rats showed a decrease in conjugated bile salt levels with a corresponding increase in levels of deconjugated bile salts. The ratio of free:conjugated bile salts was 6:1 in the blind loop, and 4:1 in the efferent jejunum as compared to normal ratios of less than 1. The electron microscope demonstrated blistering and ballooning of the microvilli associated with underlying mitochondrial swelling in the affected cells in the blind loop and distal gut areas. Bacterial contamination of the upper small intestine seemingly impairs monosaccharide transport and may be caused by abnormal bacterial flora which produce high levels of deconjugated bile salts.

7252 INTESTINAL FLUID LOSS IN HEMORRHAGIC SHOCK. (E.) Cook, B. H. (U. Mississippi Med. Ctr., Jackson), E. R. Wilson, Jr. and A. E. Taylor. *Am. J. Physiol.* 221(5):1494-1498, 1971.

In dogs under anesthesia, a 10-cm loop of small intestine (jejunum or middle or terminal ileum) was exteriorized and control absorption studies were performed. The dogs were then subjected to hemorrhagic shock at 30 mm Hg by phlebotomy and studies were repeated, followed by removal of adjacent specimens of small intestine for histochemical analysis. There was a 25% increase in absorption form the intestinal loop after phlebotomy. With i.v. replacement of fluids, there was a sharp decrease in absorption, reaching control values within 30 min and decreasing by a further 15-20% within the next half hr after which absorption was stable. Portal vein pressure doubled (from 8-16 mm Hg) during the period of increased fluid loss into the intestine. Histological examination showed that the tips of intestinal villi were "blown off" in the absence of any nuclear or cytoplasmic changes indicative of necrosis. There was no difference between normal and shocked intestine with respect to distribution or intensities of tissue cytochrome oxidase, succinic dehydrogenase, alkaline phosphatase, or acid phosphatase.

7253 1,25-DIHYDROXYCHOLECALCIFEROL: THE METABOLITE OF VITAMIN D RESPONSIBLE FOR INCREASED INTESTINAL CALCIUM TRANSPORT. (E.) Frolik, C. A. and H. F. Deluca (U. Wisconsin Coll. Agric. Life Sci., Madison). *Arch. Biochem. Biophys.* 147(1):143-147, 1971.

The role of 1,25-dihydroxycholecalciferol (1,25-DHCC) in the initiation of intestinal calcium transport was studied in vitamin D-deficient chicks using 1,25-DHCC prepared from [26,27-^{3}H]-25-hydroxycholecalciferol and purified chromatographically. Following an i.v. dose of 62.5 picomoles of 1,25-DHCC, the intestine picked up a larger percentage (5.9%) of the dose than the other tissues studied (plasma, kidney, liver, bile). From 70-82% of the radioactivity initially in the intestinal homogenate appeared in the 1,25-DHCC region of the chromatogram. To test the hypothesis that further metabolism of 1,25-DHCC may involve the loss of tritium at the 26 or 27 position, [2-^{3}H]-1,25-DHCC was injected into a group of chicks. The distribution of radioactivity appeared quite similar to that obtained with [26,27-^{3}H] -1,25-DHCC. Thus, 1,25-DHCC is seemingly not metabolized further before it initiates intestinal calcium absorption.

7254 CHARACTERISTICS OF CONJUGATED BILE SALT ABSORPTION BY HAMSTER JEJUNUM. (E.) Gordon, S. G., P. B. Miner, Jr. and F. Kern, Jr. (U. Colorado Med. Ctr., Denver). *Biochim. Biophys. Acta* 248(2):333-342, 1971.

The absorption of various concentrations of conjugated bile salts by hamster jejunal sacs in the presence and absence of fatty acid and monoglyceride, and the question of efflux of bile salts back into the surrounding medium were studied. The quantity of taurocholate and glycocholate absorbed by the tissue without lipid in the medium, and of taurocholate with lipid increased progressively as the concentration of bile salt in the medium was increased. When the approximate critical micellar concentration of the bile salt was reached, the absorption of both bile salts increased about 2-fold. Glycocholate absorption was 1.5 times greater than that of taurocholate below the critical micellar concentration, and the same as taurocholate above this point. Glycodeoxycholate absorption was 4 times greater than taurocholate and 2.5 times greater than glycocholate below their critical micellar concentration, and 1.5 times greater than either bile salt above this concentration. Net bile salt absorption was not affected by the presence of fatty acids and monoglyceride. Significant amounts of taurocholate were found to move out of the jejunal mucosa into the solution bathing the mucosal surface.

7255 THE INTESTINAL UPTAKE AND ESTERIFICATION, IN VITRO, OF FATTY ACID AS A DIFFUSION LIMITED PROCESS. (E.) Hoffman, N. E. (U. Western Australia Dept. Physiol., Nedlands) and W. J. Simmonds. *Biochim. Biophys. Acta* 241(2):331-333, 1971.

The ratio of uptake and esterification of a fatty acid (equimolar oleic acid and monoolein) by everted sacs of rat intestine was reduced when micellar media of a non-ionic detergent (Pluronic F68) were compared with bile salt micellar media (sodium taurocholate and sodium taurodeoxycholate in a ratio of 4:1). The uptake of fatty acid was linearly related to its concentration in Pluronic F68 micellar media with a regression coefficient of 0.30. The only variable between the detergent and bile salt micellar solutions was found to be the diffusion constant of the fatty acid. For bile salt solutions, with an increasing rate of uptake the percentage esterification fell, while the absolute amount of labeled lipid esterified remained essentially constant; with Pluronic F68 micellar solution, the percentage and absolute amount of labeled fatty acid increased with the rate of uptake. The absolute amount esterified in Pluronic F68 was found to have a maximum which was equivalent to that seen with tne bile salt micellar incubation, suggesting that the everted sac has a limited capacity to esterify fatty acids.

7256 MULTIPLE NEUTRAL AMINO ACID TRANSPORT SYSTEMS IN CHICKEN SMALL INTESTINE: EVIDENCE FOR A SEPARATE PROLINE TRANSFER AGENCY. (E.) Lerner, J. (U. Maine Dept. Biochem., Orono) and P. Burrill. *Experientia* 27(6):660-661, 1971.

7257 ABSORPTION OF TRACE ELEMENTS (Co, Cu, Mn, Zn) FROM THE INTESTINE. (Rus.) Faitelberg, R. O. (Odessa U., USSR) and L. I. Frolova. *Fiziol. Zh. SSSR* 57(7):1058-1066, 1971.

7258 TRANSPORT OF WATER AND ELECTROLYTES STUDIED IN LIVING RABBIT BILE DUCT. (Fr.) Chenderovitch, J. (St. Antoine's Hosp., Paris). *Rev. Eur. Etud. Clin. Biol.* 16(6): 591-595, 1971.

7259 DIGESTIVE ABSORPTIVE FUNCTIONS OF THE ENTEROCYTE. (E.) Marsh, M. N. (Univ. Hosp., Boston, Mass.). *Ann. R. Coll. Surg. Engl.* 48(6):356-368, 1971.

7260 INTESTINAL TRANSFER OF CHOLINE IN RAT AND HAMSTER. (E.) Sanford, P. A. (Univ. Dept. Physiol., Sheffield, England) and D. H. Smyth. *J. Physiol. (Lond.)* 215(3):769-788, 1971.

7261 THE EFFECT OF ACCLIMATION TEMPERATURE ON AMINO ACID TRANSPORT IN THE GOLDFISH INTESTINE. (E.) Kitchin, S. E. (U. Southampton Dept. Physiol. Biochem., England) and D. Morris. *Comp. Biochem. Physiol.* 40(2A):431-443, 1971.

7262 ALIMENTATION DEPENDENT MODIFICATIONS OF INTESTINAL ABSORPTION OF SODIUM AND WATER. (Ger.) Scharrer, E. (U. Munich Inst. Anim. Physiol., Germany), J. Lutz and E. Boehnecke. *Ernahr. Umsch.* 18(6):248-250, 1971.

See also numbers: 7339, 7711, 7982

7263 BIGUANIDES AND GASTRIC EMPTYING IN MAN. (E.) Eisner, M. (U. Basel Dept. Med., Switzerland) and W. Berger. *Digestion* 4(5): 309-313, 1971.

Sixteen patients without gastrointestinal or metabolic disorders were fed 1 of 3 test meals (750 ml tap water, alone or with 50 or 100 g glucose). Two hours before placement of a nasogastric tube subjects received 2 tablets of either placebo or 1 g dimethyl-bigaunide 'glucophage'; each subject served as his own control, the 2 tests being performed on consecutive days. With placebo, the mean half-life for gastric emptying with 0, 50 and 100 g of glucose was 10.2, 45.7 and 67.8 minutes, resp.; with the biguanide, the values were 9.2, 41.7 and 75 minutes, resp. The differences in emptying time between the 3 test meals were significant. The difference between placebo and bigaunide with a given test meal was not significant.

7264 CONTRACTILE PROPERTIES OR ORGAN-CULTURED INTESTINAL SMOOTH MUSCLE. (E.) Rikimaru, A. (Tohoku U. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 103(4):317-329, 1971.

Smooth muscle of guinea pig taenia coli preparations cultured in medium rich in horse serum and chick embryo extract responded to nicotine and transmural stimulation at low frequencies for more than 3 weeks. Responsiveness, however, was lost after 2 or 3 weeks of incubation in a medium containing lower concentration of horse serum and deficient in chick embryo extract. After 4 days in the latter type culture, which is adequate for the maintenance of smooth muscle but not nerve element, the preparations failed to produce a relaxation by transmural stimulation at high frequencies, though it was produced at low frequencies and by nicotine. The fluorescence of catecholamines disappeared at the same stage of culture, but no supersensitivity to norepinephrine and acetylcholine was observed. Histofluorometric observations of the taeniae before culture failed to reveal any adrenergic nerve cells in Auerbach's plexus even after treatment with monoamine oxidase inhibitor, although abundant intensely fluorescent nerve fibers were observed in the musculature of the taeniae and around the nonfluorescent ganglion cells in Auerbach's plexus. Apparently, there are nonadrenergic inhibitory neurons within the taenia. The transmitter, not dopamine or 5-hydroxytryptamine, of the intramural inhibitory neurons showed no fluorescence after treatment with formaldehyde vapor.

7265 ELECTROPHYSIOLOGICAL PROPERTIES OF THE SMOOTH MUSCLE CELLS OF THE BILIARY SYSTEM OF THE GUINEA-PIG. (E.) Creed, K. E. (Kyushu U. Fac. Dent., Fukuoka, Japan) and H. Kuriyama. *Jap. J. Physiol.* 21(3):333-348, 1971.

Microelectrodes were used to measure the electrical activity of the biliary system of the guinea pig. In a modified Krebs medium, the mean resting potential of the gallbladder was -36.9 millivolts (mV) and there was usually no activity. With the addition of acetylcholine, barium or tetraethylammonium chloride to the Krebs medium, the membrane of the gallbladder was depolarized and a burst of spike discharges was initiated. With insertion of 2 microelectrodes into smooth muscle cells of the gallbladder, there was good synchronization of bursts and individual spikes through the gallbladder. Spikes occurred first nearest the bile duct, and were conducted to the distal end at a velocity of 6.0-8.5 mm/sec. In the common bile duct, the membrane potential of the ampulla was -51.3 mV, and that of the rest of the duct was -38.6 mV. Spontaneous electrical activity of the common duct was the same in both the isotonic and hypertonic Krebs solutions, and there was synchronization of bursts but not of individual spikes. There was no recordable activity from the hepatic duct itself or from either the cystic or common bile duct in the region of the hepatic duct. There was no evidence of synchronization with simultaneous recordings from the ampulla of the common bile duct and from a point on the duodenum 1 mm away.

7266 ADRENOCEPTORS IN THE GUINEA-PIG COLON. (E.) Oremerod, L. P. (U. Manchester Dept. Pharmacol., England) and A. H. Weston. *Br. J. Pharmacol.* 43(2):411-413, 1971.

The antagonism of actions of isoprenaline and phenylephrine by propranolol, phentolamine, thymoxamine and dibenamine was studied. Both isoprenaline (more persistent) and phenylephrine produced a rapid concentration-dependent relaxation of distal guinea pig colon. Isoprenaline-induced relaxation was antagonized in the presence of propranolol, but not phentolamine, thymoxamine or dibenamine (except for maximum response reduction). Phenylephrine's effect on distal colon was antagonized by propranolol, phentolamine and thymoxamine. In the presence of dibenamine, the maximum response to phenylephrine was reduced by 49 percent. The action of isoprenaline on guinea pig colon is apparently mediated by beta-adrenoceptors. In the distal colon phenylephrine effects are explainable in terms of an interaction with both alpha- and beta-adrenoceptors.

7267 SPECIFIC ANTAGONISTS FOR THE MYOTROPIC ACTION OF ANGIOTENSIN II AND ANTIOTENSIN I ON THE ISOLATED RAT COLON. (E.) Gagnon, D. (Univ. Hosp. Ctr., Sherbrooke, Quebec, Canada), W. K. Park and D. Regoli. *Br. J. Pharmacol.* 43(2):409-411, 1971.

In the presence of 8-L-alanine angiotensin II (analogue of angiotensin) the response of the isolated rat colon to angiotensin II and angiotensin I decreased by about 90%, while that to acetylcholine and 5-hydroxytryptamine was not modified. 8-D-Phenylalanine-I angiotensin II had similar effect on angiotensin I and II and decreased slightly the response to 5-hydroxytryptamine; acetylcholine was not influenced. Following observation of the effect of the antagonists and superfusion with control Krebs solution, the agonists (angiotensin I and II) regained their myotropic activity 30 min later. This demonstrated the reversibility of effects of the antagonists. Specific antagonists against angiotensin I and II may be obtained by changing the spatial orientation or by removing the phenyl group of 8-phenylalanine.

7268 EFFECT OF DISTAL ANTRECTOMY ON GASTRIC EMPTYING OF LIQUIDS AND SOLIDS. (E.) Dozois, R. R. (Mayo Clin., Rochester, Minn.), K. A. Kelly and C. F. Code. *Gastroenterology* 61(5):675-681, 1971.

Prior to antrectomy, NaCl instillates were emptied rapidly from the stomach into the duodenum of intact dogs and the square root of the volume remaining in the stomach declined linearly with time, and after 25 min only 50% of the instillate remained in the stomach. Distal antrectomy slightly increased the speed of gastric emptying of the liquid instillates without disturbing the square root pattern of the emptying. Fifty percent of the instillate was evacuated in 19 min. In contrast to the slight effect on liquids, distal antrectomy markedly speeded the previous pre-antrectomy slow discharge of solid plastic spheres from the stomach. Half or more had passed into the duodenum in 1 hr or less as compared to the 4 hr required before operation. Also, rhythmic retropulsion of the spheres to the terminal antrum seen prior to the antrectomy was not seen after antrectomy. Following antrectomy gastric emptying of liquids was no longer speeded in any dog by the simultaneous administration of liquids and solids, as it had been in some dogs prior to the operation. In addition, after antrectomy, gastric emptying of solids was still not consistently altered by the simultaneous administration of liquids and solids. The distal antrum and pylorus have a minor role in the gastric emptying of liquids, but are seemingly of great importance in the gastric emptying of solids.

7269 CIRCUMFERENTIAL COUPLING OF ELECTRIC SLOW WAVES IN CIRCULAR MUSCLE OF CAT COLON. (E.) Christensen, J. (VA Hosp., Iowa City, Iowa) and R. L. Hauser. *Am. J. Physiol.* 221(4):1033-1037, 1971.

The characteristics of the spread of slow waves in the circular muscle of the cat colon in the transverse and longitudinal axes were studied using 6 volume recording electrodes aligned along 3 axes. Phase lock across all 6 electrodes was observed 92.3-100% of the time in the 0° axis, 66.7-100% of the time in the +5° axis, and 75.9-100% of the time in the -5° axis. The direction of phase lag exhibited a variety of patterns, the most common being a diverging single split pattern which occurred 56.3-68.5% of the time in the 3 axes. Waves were also observed to spread (in order of frequency) in a clockwise pattern, counterclockwise, a converging split pattern and a double split pattern. Apparent velocities did not differ either between the 2 directions or among the 3 axes (7.5-9.6 mm/sec). In the dominant situation of phase lock across all 6 recording points, coupling distance was less than 28.8 mm, nearly the complete circumference of this colonic segment. The frequency of slow waves was 2.2-2.6 cycles/min, with no apparent differences between the 3 axes.

7270 DIMETHYL SULFOXIDE, A REVERSIBLE INACTIVATOR OF RECEPTOR-EFFECTOR SYSTEMS IN THE ISOLATED GUINEA-PIG ILEUM. (E.) Zetler, G. (Lubeck Med. Acad. Inst. Pharmacol., Germany) and H.-J. Langhof. *Naunyn Schmiedebergs Arch. Pharmakol.* 270(4):361-377, 1971.

The effect of dimethyl sulfoxide (DMSO) on the smooth muscle stimulating actions of carbachol, histamine, and nicotine was studied in vitro using isolated guinea pig ileum. Only at relatively high concentrations (at least 0.13 M) did DMSO reduce the affinity and activity of these 3 spasmogens, doing so in a non-competitive manner. Great differences were observed in the speed of recovery from 1.92 M DMSO between affinity and activity of both histamine and carbachol. Under the influence of a competitive antagonist (nicotine acid tropine ester), the dose response curves shifted to the right in a parallel fashion. Whereas the effect of DMSO on the activity of the 3 contractility stimulants was reduced by an excess of calcium ($CaCl_2$) in the medium, its effect on the affinity for these agents was not influenced by Ca excess. Interference with structure and function of water in membranes and cells seems to be the mode of action of DMSO in altering the effects of carbachol, histamine and nicotine.

7271 THE FURTHER PURIFICATION OF MOTILIN, A GASTRIC MOTOR ACTIVITY STIMULATING POLYPEPTIDE FROM THE MUCOSA OF THE SMALL INTESTINE OF HOGS. (E.) Brown, J. C. (U. British Columbia Dept. Physiol. Surg., Vancouver, Canada), V. Mutt, and J. R. Dryburgh. *Can. J. Physiol. Pharmacol.* 49(5):399-405, 1971.

Physiological and chemical data obtained from studies of motilin reveal it to be quite distinct from the other identified gastrointestinal hormones extracted from the mucosa of the upper small intestine of the hog. In particular, the identification of phenylalanine as the N-terminal amino acid, the presence of glutamine and glutamic acid in large amounts, and the absence of histidine distinguish it from secretin and cholecystokinin-pancreozymin. Motilin has a stimulatory effect on pepsin secretion from fundic pouches, as does secretin, but secretin does not stimulate motor activity in fundic pouches. The action of the polypeptide in stimulating antral motor activity is similar to that seen with gastrin and cholecystokinin-pancreozymin, but this polypeptide has no pancreatic effects and will not stimulate H^+ secretion from fundic pouches.

7272 THE STOMACH AS A PUMP. (E.) Nelsen, T. S. (Stanford U. Sch. Med., Calif.) and S. Kohatsu. *R. C. Rom. Gastroenterol.* 3(2): 65-71, 1971.

7273 GASTRIC STASIS AFTER VAGOTOMY. (Fr.) Benoit, D. (CHU Cent. Radiol. Serv., Nancy, France), J. Fays, J. C. Hoeffel and P. Gaucher. *J. Radiol. Electrol. Med. Nucl.* 52(5): 275-278, 1971.

7274 A CRITICAL ANALYSIS OF THE MOTOR FUNCTIONS OF THE STOMACH IN CATTLE. (Fr.) Ruckebusch, Y. (Natl. Vet. Sch., Toulouse, France) and R. N. B. Kay. *Ann. Rech. Vet.* 2(1): 99-136, 1971.

7275 MODES OF THE STIMULATING ACTION OF PROSTAGLANDIN E_1 ON THE GASTROINTESTINAL TRACT FROM THE GUINEA PIG. (Jap.) Akanuma, M. (Sapporo Med. Coll., Japan). *Sapporo Igaku Zasshi (Sapporo Med. J.)* 38(1/2):41-52, 1970.

7276 RELATIONSHIP BETWEEN STIMULATING ACTION OF PROSTAGLANDIN E_1 AND CALCIUM ON THE GASTROINTESTINAL SMOOTH MUSCLE FROM THE GUINEA-PIG. (E.) Akanuma, M. (Sapporo Med. Coll., Japan). *Sapporo Igaku Zasshi (Sapporo Med. J.)* 38(1/2):53-59, 1970.

7277 STUDIES ON THE GASTRIC MOTILITY IN THE LLAMA. (Ger.) Ehrlein, H. J. (Sch. Vet., Hanover, Germany) and W. Von Engelhardt. *Zentralbl. Veterinarmed.* [*A*] 18(3):181-191, 1971.

7278 THE IMPORTANCE AND CLINICAL VALUE OF DISTURBANCES OF THE GASTRO DUODENAL MOTILITY. (Fr.) Labo, G. (Ist Inst. Pathol. Med., Bologna, Italy). *Med. Hyg. (Geneve)* 29(949):195-197, 1971.

7279 THE CENTRAL AND PERIPHERAL NERVOUS REGULATION OF GASTRODUODENAL MOTILITY. (Fr.) Fasano, V. A. (U. Turin Neurosurg. Serv., Italy). *Med. Hyg. (Geneve)* 29(949):194-195, 1971.

See also numbers: 7349, 7467, 7469, 7476, 8030

7280 MECHANISM OF ACTIVATION OF RAT STOMACH HISTIDINE DECARBOXYLASE AFTER VAGAL DENERVATION. (E.) Håkanson, R. (U. Lund Dept. Pharmacol., Sweden) and G. Leidberg. *Eur. J. Pharmacol.* 16(1):78-89, 1971.

No difference was found between a semi-purified preparation of histidine decarboxylase from the stomachs of vagally denervated rats and the specific enzyme characterized previously in gastric mucosal extracts from normal rats and in fetal rat tissues. In fasted rats, the enzyme activity was markedly increased after bilateral, but not after unilateral, vagotomy. In both the innervated and denervated sides of the stomach, unilateral vagotomy had no effect on the increase in enzyme activity seen with feeding and administration of insulin. The postvagotomy increase in enzyme activity was abolished by antrectomy. Perfusion of the stomach with HCl markedly reduced enzyme activity in vagotomized rats, while perfusion with phosphate buffer at pH 7.0 increased enzyme activity in normal, fasted rats. In normal, fasted rats, enzyme activity was increased by doses of atropine and propantheline bromide sufficient to inhibit acid secretion. The atropine effect was abolished by antrectomy. Histamine increased acid secretion in normal but not in vagotomized rats and reduced enzyme activity in normal, fasted but not vagotomized rats. Histamine inhibited the increase in enzyme activity in response to feeding or insulin, but not that in response to pentagastrin.

7281 INHIBITION OF GASTRIC ACID SECRETION IN VITRO BY C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ. (E.) Nakajima, S. (U. Alabama Sch. Med., Birmingham), B. I. Hirschowitz, R. L. Shoemaker and G. Sachs. *Am. J. Physiol.* 221(4): 1009-1013, 1971.

The effects of the synthetic C-terminal octapeptide of cholecystokinin (octacholecystokinin), secretin, and glucagon on isolated gastric mucosa of Necturus maculosus and Rana pipiens were studied. Addition of the octapeptide (1×10^{-7} M) to the nutrient solution was followed by a transient sharp rise in transmucosal potential difference (PD) and a fall in resistance, followed by a transient increase in PD and a decrease in resistance; however, it did not evoke H^+ secretion. Octacholecystokinin (1×10^{-7}M) administration caused a significant reduction of basal, pentagastrin-, and theophylline-stimulated H^+ secretion in the gastric mucosa of Necturus. In Rana pipiens, octapeptide (1×10^{-7}M) produced a 185% increase of H^+ secretion above the pretreatment level with a decrement in PD and resistance, and a significant decrease in the calculated short-cicuit current. Secretin, up to 7.5 clinical units per ml, and glucagon (1×10^{-4}M) had no effects whatsoever on H^+ secretion, transmucosal PD, and resistance in either species.

7282 IDENTIFICATION OF Lactobacillus AS THE SOURCE OF BACTERIAL HISTIDINE DECARBOXYLASE IN RAT STOMACH. (E.) Horáková, Z. (NIH, Bethesda, Md.), C. H. Zierdt and M. A. Beaven. *Eur. J. Pharmacol.* 16(1):67-77, 1971.

Using normal and axenic Sprague-Dawley rats it was found that several strains of Lactobacillus acidophilus are the source of bacterial histidine decarboxylase in the stomach of the rat. The organisms occurred mainly in the membranous portion and, to a lesser extent, in the glandular portion of the stomach. Some of the strains of this bacterium contained this enzyme and produced histamine. A decrease in gastric enzyme activity and gastric histamine content followed conditions which reduced the number of gastric lactobacilli, including fasting, or treatment with reserpine or neomycin. Upon exposure of axenic rats to a nonsterile environment, the stomachs were rapidly colonized by the Lactobacillus organism. The gastric juice histamine content of axenic rats was 0.1 μg/ml while that of normal rats was 3.3 μg/ml.

7283 SENSORY DEPRIVATION OF VISCERAL ACTIVITY. III. THE EFFECT OF OLFACTORY DEPRIVATION OF CANINE GASTRIC SECRETION. (E.) Schapiro, H. (U. Tennessee Med. Units, Memphis), L. G. Britt, C. W. Gross and K. J. Gaines. *Psychosom. Med.* 33(5):429-435, 1971.

Marked inhibition of gastric secretory output was observed in 4 dogs over a 4 month period after olfactory input was eliminated by aspiratio and cutting of the olfactory stalk. Three dogs with bilateral craniotomy alone evidenced no effect on gastric secretory output. Normal values for the parameters tested were established in individual dogs prior to surgery. Animal response was measured by challenge to insulin-induced hypoglycemia, teasing with meat, and histamine injection. Acid output, gastric volume, acid concentration, and pepsin concentration were all reduced in the dogs with severed stalks. Histologic study revealed no change in staining characteristics (hematoxylin and eosin, periodic acid-Schiff) nor change in the height of the gastric mucosa during the 4 months as compared with control dogs. No decrease of gastric activity was noted in the dogs with bilateral craniotomy. It is postulated that sensory input act on vagal nuclei in a definite pattern.

7284 PARIETAL CELL MASS IN HEALTHY HUMAN STOMACH. (E.) Naik, S. R., S. C. Bajaj, R. K. Goyal (Baylor Coll. Med., Houston, Tex.), D. N. Gupta and H. K. Chuttani. *Gastroenterology* 61(5):682-685, 1971.

Parietal cell mass (PCM) was estimated in stomachs of 11 healthy Indian males who died in traffic accidents. The average PCM was 1005.12 million cells per stomach with a range of 539.4 to 1981.9 million cells. The surface area of the acid-producing mucosa varied from 383 to 784 cm^2 with an average of 583.48 cm^2. A good correlation between the acid-bearing area and the mucosal volume was found and indicated that variations in the acid-bearing areas of different specimens was not due to variations in stretching of the mucosa. No correlation was found between the PCM and the age of the subjects; however, the stomachs with large surface areas were correlated with large parietal cell populations. The average total mucosal height was 0.26 mm and the average glandular mucosal height was 0.17 mm with a good correlation between the 2. These results suggest that the lower acid output attributed to Indians as compared to Western subjects may not be due to differences in parietal cell population.

7285 PLACEBO GASTRIC ANALYSIS. (E.) Rider, J. A. (Franklin Hosp., San Francisco, Calif.). *Am. J. Gastroenterol.* 56(4):364-370, 1971.

The effect of a controlled study using placebos on the basal gastric and the augmented histamine analyses was determined in 48 male volunteers who had 20 clinical units of free hydrochloric acid in each of four 15-min basal fasting gastric specimens. Placebo medication consisted of lactose, glucose or barium sulfate and was dispensed in identical capsules 3 times daily. Subjects fasted the day before the test. The morning of the test the residual gastric juice was aspirated from the stomach and the basal-hour collection consisted of gastric juice continuously aspirated and divided into 4 consecutive intervals of 15 min each. Gastric juice from each 15-min period was measured and pepsin content pooled. After basal hour gastric aspiration was discontinued, an augmented histamine test consisting of histamine and benadryl was administered i.m. The augmented histamine test always resulted in an increased volume and increased clinical units of free HCl, and a decrease in pH was measured by subsequent basal hour gastric analysis. The hourly output of pepsin increased but its concentration remained the same. Neither a single dose of placebo nor a week of placebo had any effect on the augmented histamine test or basal gastric analysis. Therefore, in this study the use of reinforced placebos had no effect upon the basic gastric analysis nor did they influence the effect of the augmented histamine test.

7286 EVIDENCE FOR AN ENTEROGASTRIC REFLEX FOR THE INHIBITION OF ACID SECRETION. (E.) Konturek, S. J. (U. Oklahoma Med. Ctr., Oklahoma City) and L. R. Johnson. *Gastroenterology* 61(5):667-674, 1971.

The effects of innervated and separated duodenal bulb pouches on acid secretion were examined in dogs prepared with a vagally denervated Heidenhain pouch (HP), a gastric fistula (GF) and a pancreatic fistula with the duodenal bulb being completely separated from the stomach after the first series of experiments. Acidification of the innervated duodenal bulb caused 50% inhibition of secretion from the GF without inhibition of secretion from the HP. Infusion of i.v. secretin (0.2 U/kg/hr) did not inhibit secretion from the GF or HP while it did produce greater pancreatic bicarbonate secretion than did bulbar acidification. A larger dose of secretin (1.6 U/kg/hr) inhibited secretion from the GF as much as bulbar acidification, and hence produced 50% inhibition of HP secretion. After separation of the duodenal bulb from the pylorus, acidification failed to inhibit acid secretion from the GF as well as the HP. Pancreatic bicarbonate responses to acification of the bulb were increased above basal responses and were equal before and after separation. Separation of the bulb did not alter the pancreatic protein or gastric pepsin responses to acidification. Low secretin doses (0.2 U) which caused no inhibition, increased the pancreatic bicarbonate response more than did acidification of either the innervated or separated duodenal bulbs. Neither bulbar acidification nor 0.2 U of secretin caused alterations in pepsin or pancreatic protein outputs whereas pancreatic bicarbonate, and gastric pepsin outputs were higher in response to 1.6 U of secretin than to either the low dose of secretin or bulbar acidification. The existence of a neural enterogastric reflex either intramural or vagovagal that is triggered by bulbar acidification seemingly explains the inhibition of gastric secretion.

7287 RELATIONSHIPS OF GASTRIN DOSE, SERUM GASTRIN, AND ACID SECRETION. (E.) McGuigan, J. E. (U. Florida Coll. Med., Gainesville), J. Isaza and J. H. Landor. *Gastroenterology* 61(5):659-666, 1971.

Dogs prepared with Heidenhain (vagally denervated) pouches were infused with pure human gastrin I. With 5 different constant rates of infusion, serum gastrin levels obtained after 30 min were increased when compared to preinfusion gastrin levels. At 60 min following infusion, serum gastrin concentrations were greater than at 30 min and remained constant in the period from 60 to 120 min. Increases in rates of gastric acid secretion accompanied increases in serum gastrin levels which, in turn, reflected increased rates of gastrin infusion. At all rates of infusion, cessation of gastrin administration was followed by reductions in acid output and serum gastrin concentrations. Serum gastrin concentrations increased progressively with increased rates of gastrin infusion from 0.125-2.0 μg/kg/hr, while acid output was not increased in the range of gastric infusion 1.0-2.0 μg/kg/hr. The log plot of the serum gastrin concentration and the rate of gastrin infusion (elimination rate) was linear and indicated that gastrin elimination was first order (exponential) throughout the range of gastrin doses used. The metabolic clearance rate of gastrin was found to be 767 ± 51 liters/day and the half life for the gastrin molecule was also determined.

7288 REVERSIBLE INACTIVATION OF THE POTENTIAL PEPSIN ACTIVITY OF PEPSINOGEN BY ALCOHOLS.

(E.) Neumann, H. (U. Manitoba, Winnipeg, Canada) and M. Shinitzky. *Biochemistry* 10(23): 4335-4342, 1971.

The normal conversion of pepsinogen to pepsin in an acid environment was hindered by the presence of various aliphatic alcohols. This inhibition was measured by the absence or partial loss of pepsin activity and was mediated by a specific conformational change on pepsinogen. The effect of the various alcohols on the pepsinogen increased with the chain length and concentration of the alcohol, as determined at pH 8.0 and a temperature of 35° C. Six molecules of methanol and ethanol and 4 molecules of 1-butanol were needed to inactivate the zymogen. The inactivation of pepsinogen at pH 10-11 or at 60° C was reversible if time was limited. A series of rapid changes decreased potential pepsin activity. Pepsinogen activity returned after urea denaturation upon dialysis of the urea. Under normal stable conditions, aliphatic alcohols reversibly denatured pepsinogen to a form characterized as insusceptible to conversion to pepsin by acid. It is concluded that the intramolecular cleavage of pepsinogen to pepsin in acid is dependent on a unique, high strain energy conformation of the pepsinogen conversion.

7289 THE EFFECTS OF LONG LASTING INTRAVENOUS INFUSION OF CAERULEIN AND SOME CAERULEIN-LIKE POLYPEPTIDES ON HISTIDINE DECARBOXYLASE ACTIVITY OF THE GASTRIC MUCOSA OF ANESTHETIZED RATS.

(E.) Melchiorri, P. (U. Rome Inst. Med. Pharmacol) and N. Sopranzi. *Agents Actions* 2(2): 58-64, 1971.

Gastric acid secretion and histidine carboxylase activity were measured after infusion of several secretory stimulants. Doses of caerulein, six caerulein analogues, pentagastrin and pancreozymin which were sufficient to elicit acid secretion increased enzyme activity, while doses that did not increase secretion had no effect on enzyme activity. The minimum effective dose of caerulein was 1.4 μg/kg/hr. Peak formation of histamine was 10 times that in controls and occurred with 10 μg/kg/hr of caerulein for 3 hr. No increase in enzyme activity was seen with perfusion beyond 3 hours with any dose. Rats pretreated with a s.c. injection of 10 mg/kg of cycloheximide showed a 70-80% decrease in acid response to 10 μg/kg/hr of caerulein and no enzyme activity. On a molar basis, caerulein was 3-4 times more potent than pancreozymin and 100-200 times more potent than pentagastrin. Compared with a secretory response of 1.0 with caerulein, that seen with the analogues was: phyllocaerulein, 1.3-1.6; C-terminal heptapeptide of caerulein, 0.3; C-terminal heptapeptide of pancreozymin, 0.5-0.8; desulfated caerulein, 0.01; Boc-Tyr(SO_3H)-Thr-Gly-Trp-N-Le-Asp-Phe(NH_2), 1.3; Tyr(PO_3H_2)-The-Gly-Trp-Met-Asp-Phe(NH_2)-CF_3 COOH, 0.005-0.01.

7290 IONIC MOVEMENT ACROSS THE GASTRIC MUCOSA OF MAN: REPRODUCIBILITY AND EFFECT OF INTRAVENOUS ATROPINE.

(E.) Ivey, K. J. (U. Iowa Coll. Med., Iowa City) and J. A. Clifton. *J. Lab. Clin. Med.* 78(5):753-764, 1971.

Ionic fluxes across gastric mucosa in 17 human subjects were measured after the introduction of 200 ml of 160 mEq/liter HCl with nonabsorbable indicator. Concentrations of H^+ and Cl^- ions and osmolality decreased while the concentration of Na^+ and K^+ ions increased. Reproducibility of values (between and within subjects) was good, being better within the same subject. After i.v. atropine administration (2.0 mg/70 kg), the H^+ ion concentration was slightly increased, Cl^- concentration was unaffected, and Na^+ and K^+ were reduced. Osmolality was increased. Atropine, also, reduced the net flux of all electrolytes into the gastric lumen, volume of gastric secretion, and the volume emptied through the pylorus. Thus, atropine did not increase the ionic permeability of the gastric mucosa. There was a net loss of H^+ ions from the gastric lumen in normal subjects and, by reducing spontaneous gastric acid secretion, atropine unmasked this H^+ loss. This, in turn, increased reproducibility of ion flux data between subjects.

7291 INHIBITION OF PROSTAGLANDIN E_1 OF GASTRIC SECRETION IN THE DOG.

(E.) Nezamis, J. E. (Upjohn Co., Kalamazoo, Mich.), A. Robert and D. F. Stowe. *J. Physiol. (Lond.)* 218(2):369-383, 1971.

In male mongrel dogs prepared with innervated (Pavlov) or denervated (Heidenhain) gastric fundic pouches, the i.v. administration of prostaglandin E_1 (PGE_1) inhibited all parameters of gastric secretion (volume, acid output, acid concentration and pepsin output). This effect was seen with either a single i.v. injection or continuous i.v. infusion, and was found to be dose-dependent. The antisecretory effects of PGE_1 were demonstrated against i.v.-administered histamine dihydrochloride, pentagastrin and 2-deoxyglucose and p.o. food. Despite the occurrenc of nausea and vomiting with PGE_1, its antisecretor effects were thought not to be due to a vomiting reflex since atropine prevented vomiting without interfering with the antisecretory effect of PGE_1 and since apomorphine-induced vomiting did not reduce histamine- or pentagastrin-induced gastric secretion.

7292 SERUM CALCIUM AND GASTRIC SECRETION IN CHRONIC GASTRIC FISTULA RAT: INFLUENCES OF PARATHYROID HORMONE AND CALCITONIN. (E.) Hotz, J. (U. Ulm Intern Med. Pediatr. Ctr., Germany), F. Widmaier, H. Minne and R. Ziegler. *Eur. J. Clin. Invest.* 1(6):486-490, 1971.

The effects of changes in the calcium level induced by parathyroid hormones (PTH) and calcitonin (CT), and non-hormonal substances (CaCl2 and EDTA) on the gastric secretion of intact, parathyroidectomized (PTX), and thyro-parathyroidectomized (TX-PTX) rats, fitted with chronic gastric fistulas, were studied. The basal secretion of calcium in both PTX and TX-PTX rats was lower than in the intact animals, but there was no difference in basal gastric secretion among the 3 groups. In both treated and untreated animals, volume and acidity behaved in the same way. Injection of Ca^{++} (i.v.) was followed by increased serum calcium level in the intact and TX-PTX animals and caused a marked inhibition of the basal secretion in both groups. PTH administered s.c. caused a slight increase in the serum Ca^{++} level 75 min after the injection, and had no effect on the gastric secretion pattern of intact and TX-PTX animals. A decrease in secretion of the intact rats was observed only when the Ca^{++} level began to rise after 90 min. EDTA had a lowering effect on the serum level of biologically active calcium regardless of different initial basal calcium levels. The EDTA-induced inhibition of basal gastric secretion corresponded to hypocalcemia, lasted throughout the entire experiment period, and showed no differences among the intact, PTX and TX-PTX animals. In intact animals calcitonin lowered the serum calcium for a period of 30-45 min after which the values returned to normal. In PTX and TX-PTX rats, however, this return was delayed. When the calcium decreasing effect of calcitonin was compensated by an adequate calcium substitution, the inhibition of acid secretion in the intact rat treated with calcitonin alone was lacking.

7293 ACID AND PEPSIN SECRETION IN RESPONSE TO INSULIN AFTER TRUNCAL VAGOTOMY IN MAN. (E.) Limbosch, J. M. (St. Pierre U. Hosp., Brussels), M. C. Woussen-Colle and J. de Graef. *Digestion* 4(5):281-288, 1971.

The effect of truncal vagotomy on acid and pepsin secretion after insulin stimulation, was studied in 21 patients who underwent vagotomy for duodenal ulcer. In 9 of 22 tests, insulin stimulation did not elicit a rise in acid or pepsin concentration within the first 2 hours. In 5 tests a positive response in pepsin concentration was observed, although acidity did not rise during the post-insulin period. In the remaining 8 tests, a positive acid and pepsin response was observed within the 2 hours after insulin injection, and in 6 of these 8 tests the pepsin response was positive at least 15 to 45 minutes sooner than the acid response. Thus, pepsin secretin in response to insulin may be a more sensitive indicator of completeness of vagotomy than acid secretion response.

7294 BOVINE PEPSINOGEN AND PEPSIN. IV. A NEW METHOD OF PURIFICATION OF THE PEPSIN. (E.) Nevaldine, B. (Med. Coll. Wisconsin, Milwaukee) and B. Kassell. *Biochim. Biophys. Acta* 250(1):207-209, 1971.

Bovine pepsin was successfully purified on Sepharose 4B coupled to poly-L-lysine, a pepsin inhibitor. Following activation of Sepharose 4B by cyanogen bromide and washing, poly-L-lysine solution was added and the mixture was gently shaken and poured onto a column. Pepsinogen from bovine gastric mucosa which had been fractionated with ammonium sulfate and activated to pepsin, was placed on the poly-L-lysine-Sepharose 48 column, which was eluted with a linear gradient of 0.15M to 1M NaCl in the acetate buffer. The portion of the peak having the highest specific activity was pooled. Recovery was 73% on the basis of proteolytic activity. Following dialysis against 0.01M sodium acetate, the concentrated enzyme was passed through a Sephadex G-100 column. At this point, 89% of activity was recovered. The overall purification from crude active pepsin was 10-fold, with a yield of 63%. Porcine pepsin behaved similarly on the poly-L-lysine column. The elution pattern of the crude pepsin solution on the poly-L-lysine resin appeared to result from a combination of affinity chromatography and ion exchange.

7295 PURIFICATION AND CHARACTERIZATION OF CANINE PEPSINOGEN. (E.) Marciniszyn, J. P., Jr. (Med. Coll. Wisconsin, Milwaukee) and B. Kassell. *J. Biol. Chem.* 246(21):6560-6565, 1971.

Canine pepsinogen was purified from the fundic mucosa of the dog and the purification was confirmed by chromatography, amino terminal analysis, ultracentrifugation, and disc and cellulose acetate strip electrophoresis. The zymogen contained 352 amino acid residues, 12 carbohydrate equivalents per mole of protein including 8 amino sugars, and 1 mole of organic phosphate per mole of protein. The amino terminal of this pepsinogen was identified as alanine-isoleucine- by the Edman method. When the canine pepsinogen was compared with bovine and porcine pepsinogen, all were similar in size, in the small number of basic residues and large number of acidic residues, and in the number of aromatic residues and cystine. The 3 zymogens differed in their content of proline, methionine, in the number of basic amino acids, and in the number of hydroxy amino acids. The fundic mucosa contained from 0.1-0.3 g of pepsinogen per 60 g portion of mucosa. The molecular weight was 39,900 by amino acid and carbohydrate content and 41,667 by ultracentrifugation; the sedimentation coefficient was 3.38 S and the diffusion coefficient was 7.37×10^{-7} cm^2/sec.

7296 ACTIVATION OF RAT STOMACH HISTIDINE DECARBOXYLASE AFTER INHIBITION OF ACID SECRETION WITH 2-PHENYL-2-(2-PYRIDYL)-THIOACETAMIDE (SC-15396). (E.) Hakanson, R. (U. Lund Dept. Pharmacol. Surg., Sweden) and G. Liedberg. *Experientia* 27(9):1045-1046, 1971.

The effect of 2-phenyl-2-(2-pyridyl)-thioacetamide (SC-15396) on the activation of gastric histidine decarboxylase was studied in rats. In a dose of 5 mg/kg (s.c.), SC-15396 prevented the stimulatory effect of a maximal dose of pentagastrin (250 mg/kg); a larger dose of SC-15396 (50 mg/kg) was required to abolish basal acid secretion. Six hr after administration of SC-15396 (50 mg/kg) to normal, fasted male rats, the gastric histidine decarboxylase activity was markedly increased as compared with controls. Antrectomy prevented the enzyme-activating effect of SC-15396. The enzyme-activating effect of SC-15396 seems to be mediated by an antral agent, possibly gastrin, which is released as a result of the inhibition of acid secretion.

7297 THE EFFECTS OF ACETIC AND ACETYLSALICYLIC ACIDS ON THE APPEARANCE OF THE GASTRIC MUCOSAL SURFACE EPITHELIUM IN THE SCANNING ELECTRON MICROSCOPE. (E.) Frenning, B. (U. Uppsala Biomed. Ctr., Sweden) and K. J. Öbrink. *Scand. J. Gastroenterol.* 6(7):605-612, 1971.

After instillation of 6 ml of acetic acid into the stomachs of cats, the luminal cell surfaces no longer appeared normally polygonal but circular. At the apical-lateral margins of these, incomplete separation in the tight junctions occurred. When 20 ml of acetic acid was instilled, the mucosal changes were more exaggerated with an extensive cell loss. The changes of the surface epithelial cells were essentially the same after irrigation of the gastric mucosa with acetylsalicylic acid. Examination of the surface epithelium at a higher magnification revealed complete breakage of intercellular bridges, reduced number of microvilli and deep clefts between cells. Treatment with 6 ml of 17 mM acetylsalicylic acid followed by 6 ml of 170 mM HCl led to macroscopically visible erosions as well as other abovementioned changes. Acetic and acetylsalicylic acids apparently increase the gastric mucosal permeability to ions, due to cellular swelling caused by intracellular accumulation of the ionized acids.

7298 FREE AMINO ACIDS AND CONCENTRATION OF AMINONITROGEN IN GASTRIC SECRETION DURING ADMINISTRATION OF PREDNISONE. (E.) Florkiewicz, H. (Med. Acad. Dept. Intern. Med., Lublin, Poland). *Bull. Pol. Med. Sci. Hist.* 14(3):118-121, 1971.

7299 TECHNIQUE OF POLAROGRAPHIC ANALYSIS OF GASTRIC JUICE. (Rus.) Mansourova, I. D., F. S. Itchad'ik and L. V. Chipilova. *Lab. Delo* (7):407-410, 1971.

7300 GASTRIC SECRETION IN HEALTH AND DISEASE. (E.) Baron, J. H. (Roy. Postgrad. Med. Sch., London) and J. E. Lennard Jones. *Br. J. Hosp. Med.* 6(3):303-306, 1971.

See also numbers: 7226, 7472

7301 DIETARY REGULATION OF PANCREATIC ENZYMES IN THE RAT WITH EMPHASIS ON CARBOHYDRATE. (E.) Snook, J. T. (Cornell U. Dept. Human Nutr., Food, Ithaca, N. Y.). *Am. J. Physiol.* 221(5):1383-1387, 1971.

Varying the proportion of fat and carbohydrate in isonitrogenous (3g casein/day), isocaloric diets was compared to the effect of varying protein and carbohydrate on rat pancreatic enzyme concentrations. Ten times more pancreatic amylase was recovered in rats fed the 5:95 mixture of fat and sucrose than was found in rats given the 95:5 mixture over a period of 2 wk. The amylolytic content was reduced when the ratio of fat:sucrose exceeded 50:50 or when carbohydrate provided less than 25% of the total calories. As amylase levels decreased, lipase and chymotrypsinogen levels increased, reaching a maximum in rats receiving the 75:25 mixture of fat to carbohydrate. Pancreas weight was reduced, chymotrypsinogen was reduced 2-fold and amylase increased almost 2-fold in rats fed a high carbohydrate-protein diet. Reduction in the protein:carbohydrate ratio decreased the trypsinogen concentration but did not affect lipase levels which in rats fed a high protein diet, resembled those of animals on a high fat diet. Although insulin did not alter enzyme levels in rats fed the high fat diet, it tended to obliterate differences between diets so that neither amylase nor chymotrypsinogen concentration differed significantly in rats fed high fat and high carbohydrate diets. Results supported the theory of purposive pancreatic adaptation to diet.

7302 EFFECTS OF DIET ON DEVELOPMENT OF EXOCRINE PANCREAS OF THE NEONATAL RAT. (E.) Snook, J. T. (Cornell U. Dept. Human Nutr. Food, Ithaca, N, Y.). *Am. J. Physiol.* 221(5): 1388-1391, 1971.

Charles River CD rats were weaned at 21 days of age on a high-carbohydrate diet and had access to maternal food throughout the nursing period, mainly after the seventeenth day. Total body weight and pancreatic content of DNA increased slowly for days 0-6, after which the rate of increase was linear and more rapid. At day 17 there was an initiation of a rapid increase in pancreatic weight, and RNA and enzyme content, when the rat pup began to eat the mother's high-carbohydrate diet. This increase in RNA was also observed when pups were denied access to mother's food; while under these conditions there was suppression of the increase in amylase but both a relative and absolute increase in chymotrypsinogen and lipase. The same situation obtained when rats were weaned on a high-fat diet simulating rat milk.

7303 THE PANCREATIC RESPONSE TO INSTILLATION OF ACID INTO THE DUODENUM AND TO EXOGENOUS SECRETIN IN MAN. (E.) Rune, S. J. (Gentofte Hosp., Hellerup, Denmark) and H. Worning. *Scand. J. Gastroenterol.* 6(4):291-296, 1971.

Maximum duodenal bicarbonate secretion was estimated during secretin infusion (0.5-10 U/kg/hr i.v.) and during instillation of increasing amounts of hydrochloric acid into the duodenum. The latter was calculated as the greatest amount of acid which would be neutralized in the duodenum. Eighteen normal subjects and 2 patients with chronic pancreatitis showed maximum release of secretin averaged about 0.5 clinical U/kg/hr. The maximum pancreatic bicarbonate output during stimulation with a dose of 3 clinical U/kg/hr. Maximum endogenous secretion of bicarbonate (25 mEq/hr) was lower than maximum exogenous secretion (41 mEq/hr). The calculation of endogenous release of secretin was based on the assumption that hydrogen ion only liberated secretin from the duodenal mucosa. The bicarbonate secretion was calculated as the mean between acid load which could be neutralized and the acid load which could not be neutralized. Calculations are based on the assumption that only the hydrogen ion liberates secretin from duodenal mucosa. The role of other hormones and pH in potentiated secretin production is considered when the maximal releasable amount of secretin is given as near 0.5 clinical U/kg/hr.

7304 THE ACTION OF PURE PIG PANCREATIC LIPASE UPON ESTERS OF LONG-CHAIN FATTY ACIDS AND SHORT-CHAIN PRIMARY ALCOHOLS. (E.) Savary, P. (St. Charles Ctr. Inst. Biol. Chem., Marseille, France). *Biochim. Biophys. Acta* 248(2):149-155, 1971.

Esters of long chain fatty acids and of straight chain primary alcohols containing 1-6 carbon atoms were hydrolyzed by porcine pancreatic lipase and relative reaction rates were evaluated as a function of the alcohol chain length. While methyl esters were hydrolyzed 5 times as fast as ethyl esters, n-hexyl esters were also cleaved at a rate 5 times that observed for n-butyl esters. N-Hexyl laurate was hydrolyzed only a little faster than methyl myristate, the rates being in the ratio of 1.1-1.3. Whereas the relative hydrolysis rates were slow for esters of C_3 and C_4 alcohols, esters of N-hexyl alcohol were cleaved faster than methyl esters. For the compounds studied, the length of the acyl chain had much less significance than the chain length of the alcohol moiety in determining the rate of hydrolysis.

7305 INDUCTION OF POLYPLOIDY IN THE RAT EXOCRINE PANCREAS BY EXCESS DIETARY METHIONINE. (E.) Bourdel, G. (Natl. Sci. Res. Ctr., Bellevue, France), A. Girard-Globa and M. Forestier. *Lab. Invest.* 25(4):331-336, 1971.

Beginning one week after weaning, male Wistar CF rats were fed a balanced semisynthetic diet containing 18.6% casein and methionine (either 0.2% in the control or 2% in the experimental diet). After rats were on this diet for 6 months, examination of pancreatic acinar cells showed experimental rats to have fewer nuclei per surface unit and to have a lower mitotic index than controls. Experimental rats had a greater nuclear diameter and a greater mean DNA content, while the ratio of proteins/DNA and RNA/DNA did not differ significantly from controls. Without alteration of the acinar structure, there still occurred ploidies of 32n and greater. Methionine excess did not increase polyploidy in hepatic parenchymal nuclei. In another series with methionine feeding for 1-8 weeks, the evolution from mononucleated to binucleated cells was inhibited at the time when polyploidy began to appear. Methionine increased the pancreatic content of all enzymes initially and of proteases after 8 weeks on the diet.

7306 THE AUTOACTIVATION OF TRYPSINOGEN.

(E.) Kay, J. (Med. Coll. Wisconsin, Milwaukee) and B. Kassell. *J. Biol. Chem.* 246(21): 6661-6665, 1971.

The formation of trypsin from trypsinogen was studied in an attempt to determine whether the zymogen itself might have inherent proteolytic activity thus enabling it to activate itself. Incubation of trypsinogen at pH 8.1 in the presence of Ca^{++} ions led to complete activation without the addition of exogenous trypsin. The length of the lag phase of the classical S-shaped profile was increased 120-fold by decreasing the trypsinogen concentration from 7.2 to 0.1 mg/m. The length of this lag phase was decreased by increasing the trypsinogen concentration, and increased by pretreatment of the trypsinogen with diisopropyl fluorophosphate or soybean trypsin inhibition, however, in all cases full activation was eventually achieved. On incubation of acetyltrypsinogen under the activation conditions, no tryptic activity could be detected even after several days, and no increase in activity was obtained on addition of exogenous trypsin. The rate of activation of the acetyltrypsinogen was unaffected by pretreatment with diisopropyl fluorophosphate and soybean trypsin inhibitor. Trypsinogen activation may occur in two phases: a slow initial formation of trypsin by autoactivation of trypsinogen followed by an increase in the reaction rate due to catalysis by trypsin.

7307 THE BIOASSAY OF SECRETIN IN THE RAT.

(E.) Tachibana, S. (Eisai Co. Res. Lab., Tokyo). *Jap. J. Pharmacol.* 21(3):325-336, 1971.

The bioassay of secretin was performed on rats of similar strain, age and body weight. Secretin was satisfactorily assayed in pylorus-ligated anesthetized rats by the measuring the pancreatic juice secreted, which was directly related to the secretin dose administered. The technique of the rat method (collection of pure rat pancreatic juice as described by Love) was very simple and when the twin crossover design was applied to determine various hormone potencies. The expected standard error was 10 to 15% when 2 to 4 rats were used. Secretin could be assayed by determining the bicarbonate output in the pancreatic juice, which changed linearly with the log doses of secretin. The relative potency of the Crick, Harper and Raper U and the Swedish Clinical U of secretin, both of which were used in the clinical diagnosis of pancreatic disorders, was determined by the rat method. The potency of 1 Clinical U was 2 to 4 times as strong as the Crick, Harper and Raper U.

7308 A COMPARISON BETWEEN SPECTROPHOTOMETRIC AND TITRIMETRIC METHODS OF ESTIMATING TRYPSIN.

(E.) Sacks, H. (Groote Schuur Hosp., Cape Town, South Africa), S. Bank, I. Kramer, B. Novis and I. N. Marks. *Gut* 12(9):727-728, 1971.

The Schwert and Takanaka spectrophotometric method for determination of trypsin activity in duodenal juice is compared with the titrimetric method (pH meter) described by Wiggins. The spectrophotometric method employs the hydrolysis of the substrate N-benzoyl-L-arginine ethyl hydrochloride in phosphate buffer (pH 8.0) in the presence of trypsin at the ester linkage which causes an increase in optical density at 253 millimicrons. The 2 methods showed a fairly high degree of correlation, with only a minor degree of variation. The less widely used spectrophotometric method correlated well with the titrimetric method, and therefore it is an effective alternative for the estimation of trypsin activity in duodenal juice. It permitted a rapid yield of results for fresh specimens from patients during the pancreatic function test. It was technically simple and used less of the expensive substrates, although it was unsuitable following a Lundh test meal due to the turbidity of the samples.

See also numbers: 7310, 7344, 7391, 7473

7309 LIPASE AND BILE SALTS IN THE SMALL INTESTINE OF THE DOG. RELATION TO LIPID ABSORPTION. (E.) Kiekens, R. (Brugmann Hosp., Brussels), P. Wissocq and J. P. Govaerts. *Digestion* 4(5):295-308, 1971.

Mongrel dogs were prepared by the insertion of a stainless steel cannula at 1 of 4 sites in the small intestine for in vivo sampling of intestinal contents after a test meal at least 1 month after surgery. The total concentration of lipids in the test meal was 124 mg/ml. Lipase activity was nearly equal in the duodenum and at the mid-jejunum, but was lower in the 2 distal sites. The concentration of conjugated bile salts increased progressively from the duodenum to the upper limit of the distal quarter of the small intestine, dropping off rapidly thereafter. The concentration of free bile salts was low throughout and did not differ between levels. In the duodenum, the test meal was diluted 5-fold and the reconcentration of the bowel content started in the proximal small intestine but was markedly increased in the distal small intestine.

7310 STIMULATION OF BILIARY SECRETION BY DUODENAL ACIDIFICATION AND SECRETIN. (E.) Konturek, S. J. (Med. Acad. Inst. Physiol., Cracow, Poland). *Scand. J. Gastroenterol.* 6(7):577-582, 1971.

Intravenous infusion of secretin (16 U) in increasing doses, or intraduodenal acid in increasing rates produced an increasing bile flow rate (maximum, 5.3 ml/15 min) in dogs. Both secretin and duodenal acid perfusion caused an increase in bicarbonate output, the maximal bicarbonate output with acid being 32% lower. Bile flow and bicarbonate output were also increased during the maximal gastric acid response to histamine or pentagastrin with the gastric fistula closed, thus permitting gastric acid to pass the duodenum. The elevation was comparable to that obtained with exogenous duodenal acidification. The maximal secretory capacity of the stomach for acid is about 30 times higher than the capacity of the liver for the bicarbonate. Hence the contribution of the biliary bicarbonate in the process of intestinal neutralization of gastric acid is almost negligible.

7311 ENZYMATIC REGULATION OF BILE ACID SYNTHESIS. (E.) Boyd, G. S. (Edinburgh U. Med. Sch., Scotland) and I. W. Percy-Robb. *Am. J. Med.* 51(5):580-587, 1971.

Isomerases, reductases, dehydrogenases and monooxygenases together with cofactors such as NADPH, NAD+, and coenzyme A participate in bile acid biosynthesis from cholesterol. Any of these enzymes or cofactors could theoretically exert control over the lengthy metabolic pathway between the C_{27} sterol and the C_{24} carboxylic acid. However, the rate-limiting event in the catabolic process may be the first reaction, since few of the intermediates in this metabolic pathway ever accumulate to sizeable proportions under physiologic circumstances. In rats subjected to biliary drainage, liver microsomal cholesterol 7 α-hydroxylase rises after 18 hr and achieves a plateau in 3 days, a time course virtually indistinguishable from changes in bile acid synthesis rates. This and other evidence suggests the mono-oxygenase, cholesterol-7 α-hydroxylase as a possible rate-limiting enzyme. The rate of turnover of this putative key enzyme is rapid; its rate of synthesis is influenced by the hepatic concentration of the end product of the overall sequence (bile salt negative feedback effect). The precise mechanism by which this control is exerted remains obscure.

7312 THE PROTECTIVE EFFECTS OF FEEDING ON THE HEPATIC ULTRASTRUCTURE OF RATS TREATED WITH HYPOGLYCIN. (E.) Brooks, S. E. H. (U. West Indies, Kingston, Jamaica) and J. H. Audretsch. *J. Pathol.* 104(3):167-174, 1971.

Hepatocytes of starved rats treated with hypoglycin (from unripe akee fruit) appeared foamy. A similar pattern was found in the 2 fed, hypoglycin-treated rats that had glucose levels below 25 mg%. No changes were seen in either starved controls or insulin-treated rats. Starved animals (controls, hypoglycin-treated, insulin-treated groups) all showed absent glycogen and 2 fed, hypoglycin rats with low glucose levels also showed glycogen depletion. No lipid was seen in fed controls, or 3 fed, hypoglycin-treated rats with normal blood glucose level. Striking vacuolization of the cytoplasm was seen in the starved, hypoglycin-treated group. The mitochondria in the fasted, hypoglycin-treated rats showed pronounced swelling, matrix pallor, loss of dense granules and incorporation into autophagic vacuoles; the mitochondrial alterations were not seen with insulin which also produced profound hypoglycemia.

7313 MEMBRANE-BOUNDED INTRANUCLEAR STRUCTURES IN HEPATOCYTES AFTER EXPOSURE TO SODIUM TETRAPHENYL BORON. (E.) Parry, E. W. (U. Liverpool Dept. Histol., England). *J. Pathol.* 104(3):210-212, 1971.

After short exposure of rat or mouse liver in vitro to sodium tetraphenyl boron, the nuclei of many hepatocytes contained small groups of vesicles and tubules usually located closer to the nuclear membrane than to the center of the nucleus. In mouse hepatocytes the membranes were arranged as tubules; in the rat they were usually vesicular. The content of the tubules and vesicles was of low to medium electron density and appeared more homogeneous than the surrounding nuclear material. In some nuclei a single tubule originating from the inner nuclear membrane clearly led to an adjacent, tubulo-vesicular aggregate. There was no evidence of smooth cytoplasmic tubules penetrating into the nucleus through nuclear pores, which appeared normal. The tubulo-vesicular aggregates probably result from rapid new synthesis or re-arrangement of nuclear membrane.

7314 ISOLATION OF A RETICULOCYTE PROTEIN WHICH SPECIFICALLY INHIBITS THE CELL FREE SYNTHESIS OF LIVER PROTEINS. (E.) Levy, F. (Inst. Molec. Pathol., Paris), L. Tichonicky and J. Kruh. *Biochemie* 53(5):671-677, 1971.

The addition of rabbit reticulocyte pH 5 fraction to a rat liver cell-free system inhibited serum albumin biosynthesis. The inhibitor, a protein, was partially purified by chromatography on carboxymethyl- and diethylaminoethylcellulose. Electrophoresis of the representative peak showed only 1 major protein band on polyacrylamide gel at pH 8.7. The molecular weight of the inhibitor was 60,000. The osolelectric point, determined by electro-focusing with a linear pH gradient between 3 and 10, was a pH of 5.4. Amino acid analysis showed a relative abundance of acidic amino acids, in agreement with the acidic isoelectric pH. A previously isolated protein from liver pH 5 fraction inhibited hemoglobin synthesis without affecting serum albumin synthesis. However, the inhibitor from reticulocytes had no effect on hemoglobin synthesis. The inhibitors are highly tissue specific.

7315 CHOLESTASIS INDUCED BY SODIUM TAUROLITHOCHOLATE IN ISOLATED HAMSTER LIVER. (E.) King, J. E. (Mayo Clin., Rochester, Minn.) and L. J. Schoenfield. *J. Clin. Invest.* 50(11): 2305-2312, 1971.

The effects of taurolithocholate on bile flow and on the biliary secretion of i.v. infused sulfobromophthalein (BSP) and bile acid anions were studied in isolated perfused hamster livers. During the first hr after i.v. administration of taurolithocholate, there was a linear relationship between the dosage of this salt and the percent decrease in bile flow, and cholestasis was induced in 15 min, in the absence of any alterations of blood flow. Persistent cholestasis followed doses greater than 5 μmoles, while with lower doses the cholestasis was reversible and bile flow returned to control values within 4 hr. During cholestasis, bile output was maintained by a significantly increased concentration of bile acids, all of which were conjugated, consisting of cholic and chenodeoxycholic acid, which comprised 75-89%; lithocholic, 11-25%; and deoxycholate, only in trace amounts. Of the infused dose of taurolithocholate, 40-50% was recovered in the bile as lithocholic acid, 30% was presumed converted to chenodeoxycholic acid, and only traces of lithocholic acid were in the perfusate at 4 hr. Injection and infusion of i.v. BSP caused a marked and persistent choleresis, during which BSP concentrations were maintained, while bile acid outputs did not differ from controls. Addition of taurolithocholate caused a significant cholestasis, during which the concentration of BSP was maintained and its output decreased, while bile acid concentration increased resulting in sustained bile output. It was calculated that 75% of basal bile flow was independent of bile acid secretion.

7316 EFFECTS OF PARTIAL HEPATECTOMY IN RATS ON TWO TRANSPLANTABLE HEPATOMAS. CHANGES IN WEIGHT AND IN SYNTHESIS OF DNA AND FERRITIN. (E.) Lee, J. C. K. (c/o G. W. Richter, U. Rochester Med. Ctr., N. Y.). *Am. J. Pathol.* 65(2):347-356, 1971.

The effects of partial hepatectomy on the growth of Reuber H-35 and H-139 hepatomas and the effect on ferritin synthesis by the H-35 hepatoma were studied in rats. After partial hepatectomy in the tumor-bearing host, both kinds of hepatomas increased in weight more rapidly than tumors growing in sham-operated or unoperated controls. In the livers of animals undergoing partial hepatectomy, DNA synthesis began to rise about 18 hr after operation, reached a peak at 30-36 hr, and declined thereafter; this increase was not observed in controls. In the H-35 hepatomas, a rise in DNA synthesis was observed 14 hr after partial hepatectomy, followed by a depression at 18 hr, after which DNA synthesis rose steadily to reach a peak at 30-36 hr. In rats with s.c. H-35 hepatomas, incorporation of ^{14}C-leucine into ferritin rose by 16 hr after partial hepatectomy, reached a peak 48 hr after the operation and returned to normal by 72 hr. The amount of ferritin obtainable from the H-35 hepatomas seemed to be about one-sixth that obtainable from the livers. Thus, these hepatomas seem to be affected by the same mechanism that stimulates the liver response to partial hepatectomy.

7317 FAT AND NITROGEN BALANCES IN RATS WITH ALCOHOL-INDUCED FATTY LIVER. (E.) Rodrigo, C. (J. J. Aguirre Hosp., Santiago, Chile), C. Antezana and E. Baraona. *J. Nutr.* 101(10): 1307-1310, 1971.

Fat and nitrogen balances were studied in rats pair-fed nutritionally adequate liquid diets containing ethanol (36% of calories) or isocaloric carbohydrate (controls). Alcohol-fed animals either lost more or gained less weight than their pair-fed counterparts. After 24 days of ethanol feeding with nutritionally adequate diets, the total lipid content in the liver doubled. The liver triglyceride content increased 3-4-fold in ethanol-treated rats. When ethanol was administere with low-protein, choline-supplemented diets, there was no significant change either in total lipid or triglyceride contents in the liver compared to those of pair-fed controls. Low-protein feeding alone led to increased triglycerides but no change in hepatic total lipids. Chronic ethanol administration with adequate protein intake did not change fecal fat or nitrogen excretion or ileal loss of nitrogen, but increased urinary nitrogen excretion. However, ethanol increased urinary excretion of nitrogen, both in high- and low-protein-fed animals. Alcohol feeding slightly decreased and low-protein feeding slightly increased fecal fat excretion. The effect of ethanol is apparently one of altering protein metabolism rather than increasing colonic breakdown of unabsorbed amino acids.

7318 A SPECIFIC, REVERSIBLE, MACROMOLECULAR INHIBITOR OF HEPATIC GLUCAGON RESPONSIVE ADENYL CYCLASE. (E.) Bitensky, M. W. (Yale U. Sch. Med., New Haven, Conn.), R. E. Gorman, A. H. Neufeld and R King. *Endocrinology* 89(5):1242-1249, 1971.

Liver supernatants contain a soluble inhibitor which is specific for glucagon-responsive adenyl cyclase. This reversible, macromolecular factor does not prevent the activation of hepatic adenyl cyclase by glucagon, nor does it influence epinephrine responsive adenyl cyclase activity. The soluble inhibitor does not appear to be a phosphodiesterase or a peptidase. Because all measurements of this inhibitor activity are made in disrupted systems, its intracellular location is uncertain. If this factor is normally found in cytoplasm, its function as a regulator is possible. However, if sequestered in a subcellular compartment, the factor may never encounter adenyl cyclase under physiological circumstances. The soluble inhibitor could function as a component of a feedback loop which regulates glucagon-responsive adenyl cyclase by coordinating its activity with epinephrine-responsive adenyl cyclase in liver.

7319 A COMPARATIVE ULTRASTRUCTURAL STUDY ON DRUG-INDUCED PROLIFERATION OF SMOOTH-SURFACED ENDOPLASMIC RETICULUM IN HEPATOCYTES. (E.) Garg, B. D. (U. Montreal Inst. Med. Exp. Surg., Quebec, Canada), J. A. Blascheck and K. Kovacs. *Tohoku J. Exp. Med.* 104(3):205-214, 1971.

The effect of phenobarbital, 3-methylcholanthrene, spironolactone, cyproterone acetate and pregnenolone-16α-carbonitride on hepatocyte smooth endoplasmic reticulum (SER) was studied in rats. All 5 drugs caused smooth endoplasmic reticulum proliferation in liver parenchymal cells, however, no significant alterations were seen in any other cell organelles. In rats treated with cyproterone or pregnenolone-16α-carbonitride, the liver cells were slightly swollen, and their cytoplasm moderately vacuolated. There was no striking change in the amount of intracytoplasmic periodic acid-Schiff-positive granules other than a slight decrease in the centroacinal region following pregnenolone-16α-carbonitride treatment. In comparing these electron microscopic findings with the biochemical and toxicological studies performed by others, it seems that there is no obligatory parallelism between SER proliferation and catatoxic potency.

7320 HEPATIC MEGALOCYTOSIS IN CHRONIC LASIOCARPINE POISONING. SOME FUNCTIONAL STUDIES. (E.) Svoboda, D. (U. Kansas Med. Ctr., Kansas City), J. Reddy and S. Bunyaratvej. *Am. J. Pathol.* 65(2):399-409, 1971.

Megalocytosis was induced in rats with lasiocarpine to study the functional capabilities of the responding hepatocytes and to characterize some aspects of the behavior of these cells. The hepatic lobules appeared smaller than normal and showed distortion of the radiating pattern of the hepatic cords from the central veins. The diameters of the hepatocytes in all parts of the lobules were increased 2-3 times compared to those in normal livers. The nuclei which were increased 2-fold contained large, prominent, multiple nucleoli. Electron microscopy revealed uniform dilatation of the endoplasmic reticulum (ER), cisternae and Golgi apparatus, few lipid vacuoles and prominent rough ER. The incorporation of ^{3}H-thymidine in both the homogenate and nuclear fractions of megalocytes was approximately twice as high as that in controls. In autoradiographs the number of labeled nuclei of megalocytes was about 7 times higher than in controls, probably due to DNA synthesis. No significant difference in total liver RNA, uptake of ^{14}C-orotic acid or in nuclear RNA polymerase activity was observed between livers of lasiocarpine-treated rats and those of controls. Tryptophan pyrrolase activity after hydrocortisone was increased to a lesser extent in treated animals than in controls. Thus, megalocytes seem to be functionally normal cells undergoing hypertrophy that are incapable of division due to the potent antimitotic action of the lasiocarpine.

7321 ACTION OF ACTINOMYCIN D ON GASTRO-INTESTINAL GLUCOSE UPTAKE AND ON THE GLUCOSE EFFECT UPON RAT LIVER TYROSINE TRANSAMINASE ACTIVITY. (E.) Hanoune, J. (Natl. Inst. Health Med. Res., Paris) and A.-M. Chambaut. *Biochim. Biophys. Acta* 252(1):212-216, 1971.

Fasted male Wistar rats were fed glucose p.o. which led to a large and sustained decrease in liver tyrosine transaminase activity. Actinomycin D (AD) given i.p. 1 hr prior to the glucose load led to a 17% decrease of the enzyme activity over a 6-hr period and completely inhibited the cortisone-stimulated transaminase synthesis. The glucose load depressed the enzyme level by

48% after 5 hr, but with combined glucose and AD enzyme activity fell by only 21%. When given 1 hr prior to the glucose load, AD prevented most of the glucose uptake. Radioactivity in control rats remaining in the stomach and intestine decreased between 1 and 3 hr from 57% to 28% of the administered dose, while the total radioactivity in liver and muscle rose 6.2 and 12%, resp. In contrast, 3 hr after glucose loading, 68% of the initial dose remained in the stomach of AD-treated rats while total radioactivity in liver and muscle was decreased by 70 to 61%, resp., as compared to controls. In addition, the radioactivity present in the blood was also reduced. While AD is effective in inhibiting the glucose effect on liver tyrosine transaminase activity, this action is seemingly secondary to its inhibition of glucose uptake from the gastrointestinal tract.

7322 POLYCHLORINATED BIPHENYLS AS INDUCERS OF HEPATIC PORPHYRIA IN JAPANESE QUAIL, WITH SPECIAL REFERENCE TO δ-AMINOLEVULINIC ACID SYNTHETASE ACTIVITY, FLUORESCENCE, AND RESIDUES IN THE LIVER. (E.)

Vos, J. G. (U. Utrecht Inst. Vet. Pathol., Netherlands), J. J. T. W. A. Strick, C. W. M. van Holsteÿn and J. H. Pennings. *Toxicol. Appl. Pharmacol.* 20(2):232-240, 1971.

The effect of various doses of polychlorinated biphenyls (PCB) administered p.o. for 7 days on the induction of hepatic porphyria was studied in male Japanese quail. The 2 quail receiving the highest dose of PCB (1000 mg/kg) died within 5 days. At necropsy, a dose related increase in liver weight and liver:body weight ratio was observed. The porphyria induced by PCB at the 1000 mg/kg dose concurred with a 20-fold increase in δ-aminolevulinic acid synthetase (ALA synthetase) activity while a dose of 50 mg/kg demonstrated a 10-fold increase in the activity of ALA synthetase. Mitochondrial protein was about doubled at the higher doses. Histologically, liver sections showed enlargement of nucleoli and nuclei in the 500 mg/kg group, the enlarged nucleoli staining partly pyroninophilic. In female quail treated with 1 and 10 mg PCB/kg there was a significant increase in ALA synthetase activity, and in those treated with 100 mg/kg there was a 20-fold increase. Fluorescence (indicating porphyrins) was observed in the livers of the quail which showed the highest hepatic PCB concentrations. Mobilization of PCB from storage fat may be responsible for the increased porphyria.

7323 STUDIES ON LIVER REGENERATION. II. EFFECTS OF PHENOBARBITAL ON THE ONSET AND PATTERN OF RAT LIVER REGENERATION FOLLOWING PARTIAL HEPATECTOMY. (E.)

Bürki, K. (Baylor U. Coll. Med., Houston, Tex.), R. Schindler and M. Pfenninger. *Cell Tissue Kinet.* 4(6):529-537, 1971.

Both in control and in phenobarbital treated rats, at a certain time after partial hepatectomy performed in the morning. the incorporation of ^{131}iododeoxyuridine (^{131}IDU) into liver started to increase and reached a maximum which was followed by a decrease and a second rise. In phenobarbital-treated animals, however, the time-lag between surgery and the initial steep rise of ^{131}IDU incorporation was 2 hr longer. When partial hepatectomy was performed in the evening, again there was a delay of the rise in ^{131}IDU incorporation in phenobarbital-treated rats; however, the initial rise following the lag phase was considerably steeper in rats pretreated with phenobarbital. Phenobarbital-treated rats showed a slower rise in mitotic activity following partial hepatectomy in the morning and showed a delayed increase (4 hr) following surgery in the evening. Overall, the increase in mitotic activity was more pronounced and the maximum considerably higher in the phenobarbital-treated animals. Pre-existing drug induced hypertrophy may enhance the prolifer tive response of liver parenchymal cells to partial hepatectomy.

7324 EARLY STAGE IN THE METABOLISM OF AMINOA DYES IN THE LIVER OF RATS. (E.)

Du Plooy, M. (South African Council Sci. Indust. Res., Pretoria) and J. Dijkstra. *Chem. Biol. Interactions* 4(3):163-173, 1971.

After a 4 hr fast, male albino rats received, by intragastric instillation, 25 mg/100 g body weight of N,N-dimethylaminoazobenzene (DAB). The maximum appearance of dye in trichloroacetic acid (TCA) extracts of livers occurred at 4 hr after dosing. These metabolites were similar to the "early metabolite" of the 3'methyl ester of DAB in that 75% of the dye extractable with TCA was not soluble in ethyl ether. By thin layer chromatography, approximately 90% of these polar TCA-soluble metabolites could be accounted for as the ethereal sulfates of the 4'-hydroxy ester of DAB and N-monomethylaminoazobenzene. The other 4 fractions eluted from the chromatography were also ethereal sulfates.

7325 ETHYL-α-p-CHLOROPHENOXYISOBUTYRATE INDUCED HEPATIC MICROBODY PROLIFERATIO IN RAT LIVER AND UBIQUINONE CONCENTRATION. (E.)

Reddy, J. (U. Kansas Med. Ctr., Kansas City) and D. Svoboda. *Experientia* 27(9):1059-1061, 1971.

The relationship between increased hepatic ubiquinone levels and enhanced catalase activit and microbody proliferation resulting from the administration of ethyl-α-p-chlorophenoxyisobutyrate (CPIB) was studied in male rats. The liver parenchymal cells of rats treated wit CPIB for 3 weeks revealed a significant increas in the number of microbodies. However, those treated with varying concentrations of ubiquinone showed no change in microbody number. Whereas CPIB treatment significantly increased the catalase activity in the liver (closely paralleling the increase in microbody number), the administration of ubiquinone did not increase the catalase activity significantly. Thus, ubiquinone does not appear to be involved in the microbody proliferation and in the increase in catalase activity that accompanies the administration of CPIB.

7326 THE EFFECTS OF VARIOUS DRUGS AND TOXIC AGENTS ON BILE FLOW RATE AND COMPOSITION IN THE RAT. (E.) Slater, T. F. (Brunel U. Dept. Biochem., Uxbridge, England) and V. B. Delaney. *Toxicol. Appl. Pharmacol.* 20(2):157-174, 1971.

The effects of various hepatotoxins and some nontoxic drugs on bile flow rate and composition were studied within a few hr of drug administration and related to changes in the NAD concentrations in male and female rats. While bile flow was unaffected by the administration of CCl_4 or dinitrophenol, 1 hr after dimethylnitrosamine administration a transient choleresis was observed. Decreases in the bile flow rate were observed immediately after the administration of either sodium succinate or sodium malonate; however, the effect of the succinate did not persist. When sodium taurocholate was injected, maximum choleresis was observed 20-30 min after dosing. Decreases in bile flow in response to ethionine commenced shortly after administration, were gradual, and were most noticeable in female rats. Bile flow/g liver/hr was increased to only a small extent by the administration of sodium phenobarbital. Thus, of the agents studied, only taurocholate, dimethylnitrosamine, and phenobarbital produced an increase in bile flow. CCl_4, dimethylnitrosamine, ethionine, dinitrophenol, and malonate all decreased bilirubin output and concentration within 2 hr of dosing. No apparent correlation was observed between the total liver contents or redox status of the nicotinamide adenine dinucleotides and bile secretion.

7327 A NOTE ON THE STABILITY OF CONJUGATED DIENE ABSORPTION OF RAT LIVER MICROSOMAL LIPIDS AFTER CARBON TETRACHLORIDE POISONING. (E.) Srivivasan, S. (Case Western Reserve U. Sch. Med., Cleveland) and R. O. Recknagel. *J. Lipid Res.* 12(6):766-767, 1971.

Conditions that would permit storage and shipment of liver tissue prior to ultimate analysis is presented using rats given carbon tetrachloride (CCl_4). Rats given a mixture of CCl_4 and mineral oil (2:1 v/v) and controls given only mineral oil were killed and the hepatic microsomal enzymes were examined for conjugated diene absorption. Samples were also preserved in 0.25 M sucrose 0.003 M EDTA, pH 7.4 and kept frozen just below 0°C for 7 days. The difference spectrum, CCl_4-poisoned minus controls, for the livers analyzed immediately, was almost identical with the corresponding difference spectrum determined 7 days later. A very slight increase in absorption near 280 nanometers (nm) was indicative of conjugated trienes; while most of the samples had an absorption maximum near 235 nm, which was indicative of conjugated dienes. Therefore, frozen livers can be stored up to 7 days with confidence that analysis of microsomal liver peroxidation can be evaluated. To simulate autopsy conditions in practice, killed rats were left at room temperature (25°C) for 2 hr and then frozen for 7 days in the sucrose-EDTA suspension. No detectable microsomal lipid peroxidation was detected and the CCl_4-induced difference spectrum was identical with the difference spectrum determined immediately after the 2 hr delay. Results were variable and unreliable after 14 days of storage of whole liver samples below 0°C. These observations establish realistic boundary conditions for postmortem handling of human liver tissue in preparation for ultimate work-up and analysis of peroxidative decomposition of lipids.

7328 INHIBITION OF LIPID SYNTHESIS IN ISOLATED RAT HEPATOCYTES BY SERUM LIPOPROTEINS. (E.) Cooper, B. (Johns Hopkins U. Dept. Med., Baltimore, Md.) and S. Margolis. *J. Lipid Res.* 12(6):731-739, 1971.

Following treatment of rat liver with collagenase and hyaluronidase the incorporation of labeled acetate into lipids of hepatocytes was studied. About 60% of the acetate incorporated into total lipids was free cholesterol and 13% was in tryglycerides. Human serum lipoproteins markedly inhibited incorporation of acetate into lipids while chylomicrons did not inhibit incorporation. In addition, the distribution of radioactivity among lipid classes was unchanged in the presence of lipoproteins. At concentrations that are maximally inhibitory for acetate incorporation, lipoproteins did not alter leucine incorporation into cellular protein. This suggests that lipoproteins do not diminish lipid synthesis by a direct toxic effect on hepatocyte cellular metabolism. Acetate incorporation was also not diminished in the presence of deplipidated protein from low density lipoprotein or lecithin present in amounts required to produce comparable effects of inhibitory concentrations of lipoprotein. In addition, cholesterol-lecithin emulsions containing small amounts of free cholesterol had no inhibiting effect on lipid synthesis. Lipoprotein inhibition of acetate incorporation may be important in the physiologic control of liver lipid biosynthesis.

7329 INFLUENCE OF SELECTIVE HEPATIC VASCULAR PERFUSION ON AMMONIA METABOLISM IN DOG. (E.) Lambilliotte, J. P. (St. Peter Hosp., Brussels) and J. C. Pector. *Scand. J. Gastroenterol.* 6(6):553-557, 1971.

Ammonium chloride (45 mg/kg/hr) was perfused continuously through either the hepatic artery, a peripheral vein or the portal vein in 20 dogs. Peripheral venous perfusion resulted in a marked increase in the peripheral arterial level of ammonia, rising during the first 10 min of perfusion and then maintaining a constant level throughout the perfusion. Portal vein perfusion of ammonium chloride solution also resulted in an increase in the peripheral arterial level of ammonia. Also, the hepatic vein remained completely normal. In contrast to the other groups, continuous ammonium chloride perfusion into the hepatic artery did not change the peripheral arterial ammonia concentration nor the hepatic vein ammonia level. Apparently during portal perfusion a fraction of ammonium chloride solution is shunted before reaching the sinusoids, whereas during hepatic artery perfusion, the entire amount of solution is cleared by the liver, and no shunts can be detected.

7330 INDUCTION OF TYROSINE AMINOTRANSFERASE AND AMINO ACID TRANSPORT IN MORRIS HEPATOMAS AND IN ADULT AND NEONATAL RAT LIVER. (E.) Reynolds, R. D. (Univ. Biochem. Inst., Freiburg, Germany), D. F. Scott, V. R. Potter and H. P. Morris. *Cancer Res.* 31(11):1580-1589, 1971.

The induction of tyrosine aminotransferase and the amino acid transport system was studied in rats bearing 1 of several Morris hepatomas after injection of glucagon, theophylline, or dexamethasone, or by the feeding of a high-protein diet. Tyrosine aminotransferase and the amino acid transport system in the hepatomas and host livers responded to the inducing agents to varying degrees and from widely different initial fasting values. No hepatoma lines or their host livers responded similarly to all inducing agents. Tyrosine aminotransferase induction was investigated in neonatal rat liver with glucagon and/or theophylline, or dibutyl cyclic AMP. The data obtained with the hepatomas was paralleled by the wide range exhibited by the changes during the shift from neonatal to adult liver. Hepatoma 9618A, at the lower end of the range, resembled the earliest neonatal liver (0-9 days of age) in terms of its tyrosine aminotransferase activity, whether induced or occurring naturally. However, other hepatomas may exceed normal adult liver in naturally occurring or induced levels of tyrosine aminotransferase or amino acid transport, while resembling neonatal liver in other respects.

7331 BILE ACID SULFATES. I. SYNTHESIS OF LITHOCHOLIC ACID SULFATES AND THEIR IDENTIFICATION IN HUMAN BILE. (E.) Palmer, R. H. (U. Chicago Dept. Med., Ill.) and M. G. Bolt. *J. Lipid Res.* 12(6):671-679, 1971.

The 3α-sulfate esters of bile acids (lithocholic, glycolithocholic, and taurolithocholic acids) were prepared with sulfur trioxide and pyridine. Bile acid sulfates were crystalized from methanol or ethanol as the diammonium salts, and their chromatographic, chemical compositions and infrared spectral properties were determined. The bile acid sulfates were not oxidized by the enzyme 3α-hydroxysteroid dehydrogenase which confirmed the complete esterification of the 3α-hydroxyl group. Incubation of taurine or glycine conjugated bile acids sulfates with cholyglycine hydrolase resulted in hydrolysis of the amide linkage while the sulfate ester group was not affected. Strong alkaline hydrolysis of bile acid sulfates resulted in hydrolysis of amide linkages, partial disruption of the sulfate esters and alterations in the steroid nuclear configuration. Radioactive lithocholic acid administered p.o. to 3 patients with cholelithiasi gave rise to 4 sulfated biliary conjugates; glycolithocholic and taurolithocholic acids, and 2 unidentified, more polar compounds. The extent to which endogenous lithocholic acid had undergone glycine conjugation, taurine conjugation and sulfation was determined in 2 patients and was found to be 41% and 75% of the total, using isotope dilution techniques. The physiological and pharmacological properties and toxic effects of lithocholic acid may be affected by sulfation.

7332 BILE ACID SULFATES. II. FORMATION, METABOLISM, AND EXCRETION OF LITHOCHOLI ACID SULFATES IN THE RAT. (E.) Palmer, R. H. (U. Chicago Dept. Med., Ill.). *J. Lipid Res.* 12(6):680-687, 1971.

Following administration of labeled lithocholic acid to bile fistula rats, labeled compounds with the chromatographic mobility of glyco- or taurolithocholic acid sulfate were observed in bile samples and constituted less than 10% of the labeled metabolites but accounted for over 20% of the total secreted monohydroxy bile acids in the first or second hr. When labeled glycolithocholic acid was placed in the intestine 70% of the administered dose was recovered in the bile and the major portion of the isotopes was excreted 10-20 hr after its administration. All of the isotope collected from the bile had the chromatographic mobility of sulfated monohydroxycholanates. The disposition of sulfated and nonsulfated lithocholates differed in both route and rate of excretion. Rats fed labeled lithocholate excreted an average of 6% of the given isotope in the urine, whereas those fed the sulfated glycine conjugate excreted almost 24%, and the rate of excretion of the total isotope in the feces and urine was also more rapid in the latter group. Prior to fecal excretion the amino acid and sulfate moieties were almost completely removed. Sulfation of lithocholates does occur in rats with consequent alterations in their patterns of metabolism and excretion, and the study of this animal may be helpful in the investigation of the sites and mechanism of sulfation.

7333 ISOLATION OF 3β, 7α-DIHYDROXYCHOL-5-EN-24-OIC ACID, AN INTERMEDIATE OF CHENODEOXYCHOLIC ACID BIOGENESIS, FROM FISTULA BILE OF THE RAT AND HEN. (E.) Yamasaki, K. (Tottori U. Sch. Med., Yonago, Japan), Y. Ayaki and H. Yamasaki. *J. Biochem. (Tokyo)* 70(4):715-718, 1971.

Fistula bile was collected for 6 hr from rats given 2-^{14}C-DL-mevalonate or 4-^{14}C-cholesterol and was hydrolyzed (130°C, 2M KOH, 3 hr). Following column chromatography and liquid scintillation spectrometry, 3β,7α-dihydroxychol-5-en-24-oic acid, an intermediate of chenodeoxycholic acid biogenesis, was found. A hen with a bile fistula was injected with 4-^{14}C-7α-hydroxycholesterol, and the bile collected for 7 days was hydrolyzed as above. An aliquot of the dihydroxy acid zone showed 2 Lifschütz positive spots on a thin-layer plate. One of the spots coincided with that given by 3β-7α-dihydroxychol-5-en-24-oic acid. Following elution with methanol, rechromatography, and radioscannography, the above-mentioned area was sharply divided into 2 radioactive parts, one corresponding to methyl 3β,7α-dihydroxychol-5-en-24 oate and the other to methyl 3β,7α-dihydroxychol-4-en-24-oate.

7334 THE INDUCTION OF LIVER ENZYMES BY CORTISOL AFTER COMBINED TREATMENT OF MICE WITH X-IRRADIATION AND INHIBITORS OF PROTEIN BIOSYNTHESIS. (E.) Streffer, C. (U. Freiburg Radiol. Inst., Germany) and S. Schafferus. *Int. J. Radiat. Biol.* 20(4):301-313, 1971.

The effect of X-irradiation on the ability of cortisol to induce hepatic enzymes was studied in mice treated with actinomycin D (AD), puromycin or ethionine. When cortisol (40 mg/kg) was injected 2-3 min before 2000 r or more of X-rradiation, synthesis of tryptophan pyrolase was decreased, while that of tyrosine aminotransferase was unchanged. Hormonal induction was strongly nhibited by the simultaneous administration of AD (120 mg/kg) and cortisol before whole body X-rradiation (4000 R). Puromycin (100 mg/kg) markedly impaired the induction of tryptophan pyrrolase after whole body irradiation but had ittle effect on tyrosine aminotransferase inuction. Administration of ethionine (20 mg/kg) was followed by a reduction in the induction of ryptophan pyrrolase after high radiation doses, hile induction of tyrosine aminotransferase was nchanged. The observed radiation-induced altera-ions may involve specific effects at the trans-ational level of protein synthesis.

335 STUDIES ON LIVER REGENERATION. I. ^{131}IODODEOXYURIDINE AS A PRECURSOR OF NA IN NORMAL AND REGENERATING RAT LIVER. (E.) Urki, K. (Baylor U. Coll. Med., Houston, Tex.), . C. Schaer, A. Grieder, R. Schindler and H. ottier. *Cell Tissue Kinet.* 4(6):519-527, 1971.

wo hr after the injection of ^{131}iododeoxyuridine ^{131}IDU) into both normal and partially hepatectomized rats, considerably more radioactivity was present in the acid-soluble fraction than in DNA. As a result of extensive elimination of label contained in the acid-soluble fraction 24 hr after ^{131}IDU administration, the amounts of radioactivity incorporated into DNA were of the same order of magnitude as those in the acid-soluble fraction, whereas the 48-hr acid-soluble label had reached much lower levels. Only 1.8-16.6% of total radioactivity was found in hepatic DNA 2 hr after ^{131}IDU injection. However, in tissue subjected to formalin fixation with selective extraction of the acid soluble label, 64-89% of the remaining radioactivity was in DNA. Hence, radioactivity not extracted by formalin may be used as a measure of DNA synthesis at the time of ^{131}IDU injection, thus obviating time-consuming biochemical fractionation procedures.

7336 EFFECT OF CARBON TETRACHLORIDE ON ENDOPLASMIC ENZYMES IN RAT LIVER. (Ger.) Heni, N. (U. Tubingen Inst. Toxicol., Germany) and H. Remmer. *Arch. Toxikol.* 28(1):1-11, 1971.

When administered to male Wistar rats 3 hr before decapitation, CCl_4 (1.25-5.00 ml/kg p.o. through a stomach tube) caused dose-dependent inhibition of ribosomal glucose-6-phosphatase and cytochrome P_{450}, but had no effect on the activities of ribosomal pseudocholinesterase, NADPH-dependent cytochrome c reductase, or cytochrome b_5 in the liver. Oxidation appears to be dependent on factors other than cytochrome P_{450} since the rate of hydroxylation, determined by the amount of formaldehyde formed during the oxidation of aminopyrine, decreased to a greater extent than cytochrome P_{450} activity. Since cytochrome P_{420} was not found in liver ribosomes from CCl_4-treated rats, it is concluded that CCl_4 destroys the structure of cytochrome P_{450} to a greater extent than detergents and lipases which convert it into cytochrome P_{420}. Treatment of rats with phenobarbital (80 mg/kg/day i.p.) for 3 days before administration of CCl_4 enhanced the effect of CCl_4 on cytochrome P_{450} but had no effect on the decrease in glucose-6-phosphatase. These findings appear to support the hypothesis that CCl_4 must be converted into an active metabolite, possibly a free radical, before it can damage the endoplasmic reticulum.

7337 INHIBITION OF HEPATIC TRIGLYCERIDE FORMATION BY CLOFIBRATE. (E.) Adams, L. L. (U. North Carolina Sch. Med., Chapel Hill), W. W. Webb and H. J. Fallon. *J. Clin. Invest.* 50(11):2339-2346, 1971.

The effect of clofibrate (ethyl chlorophenoxyisobutyrate) on the hepatic synthesis of glycerolipids was studied in vivo in male Sprague-Dawley rats fed a diet with 0.25% clofibrate for 2 weeks and in vitro in homogenates from rats not fed clofibrate but with incubation of the homogenate preparation with various concentrations of this drug. With administration of clofibrate p.o. for 2 weeks, there was a 38% decrease in mean serum triglyceride levels and an increase of up to 40% in hepatic triglyceride content. There was a 22% increase in mean liver weight in rats fed clofibrate but there was no significant change in mean total body weight. Mean levels of serum glycerol were regularly lower in clofibrate-fed rats. Most of these changes were observed within 6 hr of initial administration of clofibrate. Results were similar when the 0.25% clofibrate was administered with a high-glucose diet. In the in vitro preparations, incorporation of ^{14}C-sn-glycerol-3-phosphate into di- and triglyceride was inhibited by 1-40 mM clofibrate, suggesting that clofibrate possibly reduces hepatic glycerolipid synthesis by the inhibition of 1 or more reactions in the esterification of sn-glycerol-3-phosphate.

7338 PRODUCTION AND EXCRETION OF BILIRUBIN IN GUNN RATS TREATED WITH PHENOBARBITAL.

(E.) Robinson, S. H. (Beth Israel Hosp., Boston, Mass.). *Proc. Soc. Exp. Biol. Med.* 138(1):281-284, 1971.

There was no significant change in the serum bilirubin concentration or in any of the indices of bilirubin turnover after treatment of Gunn rats with phenobarbital. In 2 drug treated Gunn rats, 1 month after completion of the second turnover study, there was a small rise in the initial sharp component of early labeled bilirubin formation. After 10 hr, both curves fell to within the normal range. There is apparently only minimal enhancement of bilirubin production from nonhemoglobin sources in the liver, in contrast to the large changes reported for normal animals. Phenobarbital seemingly does not stimulate the alternate pathways by which animals are unable to conjugate bilirubin and excrete bile pigment.

7339 THE MAGNITUDE OF NONELECTROLYTE SELECTIVITY IN THE GALLBLADDER EPITHELIUM.

(E.) Smulders, A. P. (U. California Med. Ctr., Los Angeles) and E. M. Wright. *J. Membrane Biol.* 5(4):297-318, 1971.

Rabbit gallbladder epithelial permeability to nonelectrolytes was determined by radioactive tracer techniques and by a previously described osmotic procedure. There was good agreement between the selectivity sequences obtained by the 2 methods for the 16 compounds used. Although there was a direct relationship between permeability coefficients and bulk phase partition coefficients, the gallbladder behaved as if the membranes controlling selectivity were more hydrophobic than isobutanol. The permeability coefficient-molecular weight relationship revealed a less viscous membrane than other single cell membranes. The demonstration of lower apparent activation energies for permeation of small polar solutes supported the view of small polar-molecule permeation across gallbladder membrane by a polar pathway. The apparent sucrose activation energy was indistinguishable from that reported for diffusion in aqueous solution and inulin and sucrose permeability coefficients were in the ratio of their free solution diffusion coefficients. The presence of few large pores in the epithelium may explain the above findings.

7340 THE INFLUENCE OF POSTNATAL DEVELOPMENT ON DRUG-INDUCED HEPATIC PORPHYRIA AND THE SYNTHESIS OF CYTOCHROME P-450. A BIOCHEMICAL AND MORPHOLOGICAL STUDY.

(E.) Song, C. S., H. L. Moses, A. S. Rosenthal, N. A. Gelb and A. Kappas. *J. Exp. Med.* 134(5):1349-1371, 1971.

There was a progressive 12-fold increase in hepatic delta-aminolevulinate synthetase activity within 12-16 hr after allylisopropylacetamide administration to adult rats. Despite the great potency of allylisopropylacetamide for induction of this enzyme in adult rats, an essentially complete lack of full responsiveness to the induction of the above synthetase characterized the fetuses and the newborn animals. This refractoriness lasted until about 10 days of age, with inducibility increasing rapidly thereafter. Ultrastructural changes accompanying the induction of delta-aminolevulinate synthetase by drugs and chemicals in adult livers included: hypertrophied hepatocytes, enlarged nucleoli, marked proliferation of smooth endoplasmic reticulum membranes and dense lipid-like material in Golgi associated vesicles. No detectable structural alterations, however, were observed in neonatal rats following drug administration. Significant drug-induced changes of hepatic cytochrome P-450 (hemoprotein) and of heme-precursor incorporation into this cytochrome did take place in neonates. Delta-Aminolevulinate synthetase, but not cytochrome P-450, belongs to an increasingly large group of hepatic enzymes in mammals whose appearance, increase of activity, or inducibility is developmentally determined.

7341 THE GALACTOSE UTILIZATION RATE IN LIVER SLICES FROM MAN AND RAT AND ITS RELATION TO THE LACTATE/PYRUVATE RATIO OF THE MEDIUM.

(E.) Tygstrup, N. (Natl. Hosp., Copenhagen), A. Schmidt and H. I. D. Thieden. *Scand. J. Clin. Lab. Invest.* 28(1):27-31, 1971.

Galactose utilization rate changes were studied by altering the lactate/pyruvate concentration ratio by addition of lactate, pyruvate, and ethan in liver slices from rat and man. Pyruvate addition increased the galactose utilization rate; lactate caused no significant change; ethanol decreased galactose utilization by 20%. Utilization of pyruvate by gluconeogenesis and carboxylation to oxaloacetate increased ADP formation which may accelerate NADH oxidation through the respiratory chain. Combinations of lactate, pyruvate, and ethanol additions caused intermediate changes, independent of the resulting lactate/pyruvate ratio. Addition of pyruvate increased NAD formation, but lactate had no influence on NAD or NADH. Galactose utilization rate was twice as great for human liver slices as compared to rat liver slices. Evidence indicated a dissociation between cytoplasmic NADH/NAD ratio and lactate/pyruvate concentration ratio in the medium. The lactate/pyruvate ratio of the medium may fail to reflect the NADH/NAD ratio of the cytosol when lactate or pyruvate was added.

7342 SENSITIVITY OF CHOLESTEROL TURNOVER IN RAT LIVER TO COLD ENVIRONMENTAL STRESS.

(E.) Kato, M. (Osaka Med. Coll., Japan). *Am. J. Physiol.* 221(5):1255-1259, 1971.

Following the injection of acetate-1-^{14}C into control and alloxan diabetic rats, and sacrifice at 4-day intervals up to 28 days, decay curves revealed decreased rates of cholesterol turnover in the diabetic rats. In control and alloxan diabetic rats exposed to cold (2±1°C), the cholesterol specific activities in rat liver were less than those of the control (normal temperature), suggesting a defect in cholesterologenesis. Alloxan diabetic rats exposed to cold showed a larger decrease in specific activities than alloxan diabetic rats at room temperature. The effects of prolonged cold exposure (for 1,2, or 3 months followed by serial sacrifice at 4-day intervals up to 28 days) on normal and diabetic rats produced a decrease of cholesterol turnover rates in the liver. Both the amounts of expired $^{14}CO_2$ and urine total activity produced by the diabetic rats in the cold room were lower than those for the controls. There may be a defect in the mechanism of cholesterol degradation in the diabetic rats, and the effects of long, continuous cold environment on the normal and diabetic rats produced the decrease of cholesterol turnover rates in the liver.

7343 GLYCOPROTEINS IN HUMAN BILE. (E.)

Bouchier, I. A. D. (U. London Dept. Med.) and J. R. Clamp. *Clin. Chim. Acta* 35(1): 219-224, 1971.

Glycoproteins occur in excess in cholelithiasis and have been identified in human gallstones. The biliary glycoprotein content of liver bile from 7 patients with draining T tubes was analyzed. Three of the patients did not have biliary tract disease, four had cholesterol stones removed from the gallbladder and the common bile duct. Samples were collected for 10 days under sterile conditions, frozen, then pooled for analysis. No differences were found between the normal and lithogenic biles, either in carbohydrate or amino acid content. Two types of glycopeptide were revealed by Pronase digestion. Type 1 glycopeptide had a higher molecular weight, contained less mannose, more fructose and N-acetylgalactosamine than type 2. Type 2 glycoproteins are more comparable to serum glycoproteins. Gallbladder bile, particularly in cholelithiasis, might differ from hepatic bile.

7344 HORMONAL AND DIETARY CONTROL OF ENZYMES IN THE RAT. IV. DIETARY CONTROL OF SOME LIVER ENZYMES UNIQUE TO AMINO ACID METABOLISM AND GLUCONEOGENESIS AND ITS DEPENDENCE ON PANCREATIC HORMONES.

(E.) Matsutaka, H. (Osaka U. Inst. Protein Res., Japan), K. Nakajima and E. Ishikawa. *J. Biochem. (Tokyo)* 70(3):395-405, 1971.

In male and female Sprague-Dawley rats, the starvation-induced increase in activity of hepatic serine dehydratase was inhibited by prefeeding the rats with lactate or glycerol. The starvation-induced decreases in activity of phosphoenolpyruvate carboxykinase and tyrosine transaminase were reduced by prefeeding with lactate but not with glycerol. There was no difference in depression of enzyme activities with prefeeding with various glucogenic amino acids (L-alanine, L-proline, monosodium L-glutamate and an L-alanine-L-proline mixture). Prefeeding with the amino acids did not induce activity of serine dehydratase in rats subjected to prior pancreatectomy, while amino acid feeding was capable of inducing activity of tyrosine transaminase in rats subjected to removal of pancreas, adrenal cortex and hypophysis. In rats subjected to hypophysectomy and pancreatectomy the effects of glucagon and the amino acid mixture on tyrosine transaminase activity were additive. Activity of phosphoenolpyruvate carboxykinase in pancreatectomized rats was decreased by administration of glycerol and insulin and, to a lesser extent, by glycerol alone.

7345 ETHANOL-INDUCED FATTY LIVER IN RATS: EFFECTS OF PYRAZOLE AND GLUCOSE. (E.)

Domanski, R. (Med. Coll. Pennsylvania, Philadelphia), D. A. Rifenberick, F. Stearns, R. M. Scorpio and S. A. Narrod. *Proc. Soc. Exp. Biol. Med.* 138(1): 18-20, 1971.

Pyrazole (4 millimoles/kg) protection against ethanol-induced fatty liver due to differences in sex or elapsed time between the injection of pyrazole and the administration of ethanol was studied in male and female Sprague-Dawley rats. A single acute dose of ethanol (6 mg/kg) resulted in a 3-fold increase in liver triglycerides which was lowered to control levels by pyrazole in male rats. In female rats triglyceride accumulation was higher, and pyrazole was less effective in lowering the triglycerides following acute ethanol administration. In both groups, the effects of pyrazole were the same whether injected 4 hr or 10 min prior to ethanol administration. In the absence of pyrazole glucose markedly lowered the triglyceride accumulation following ethanol administration in both male and female rats. Blood ethanol levels were only slightly reduced in the presence of pyrazole.

Acute ethanol administration resulted in a lower hepatic NAD/NADH ratio in animals that received no pyrazole as compared to pyrazole-treated rats. The microsomal ethanol oxidizing system showed no significant change in activity associated with acute ethanol administration with or without pyrazole administration. The difference in effect of pyrazole on hepatic triglyceride is seemingly related to sex rather than to drug action time or absorption and in female rats liver ethanol metabolism is not necessary for triglyceride accumulation. Glucose protects against fatty liver in both sexes by some effect other than increasing ethanol metabolism.

7346 D-GALACTOSAMINE HEPATOTOXICITY. II. MECHANISM OF FATTY LIVER PRODUCTION.

(E.) Koff, R. S. (Boston VA Hosp., Mass.), J. J. Fitts and S. M. Sabesin. *Proc. Soc. Exp. Biol. Med.* 138(1):89-92, 1971.

The pathogenesis of fatty liver was studied in the rat by investigating the effects of D-galactosamine on protein synthesis and lipoprotein secretion. Hepatic triglycerides were increased more than 3-fold at 24 hr in D-galactosamine-treated animals when compared to saline or D-glucosamine-treated controls. Adenine, ATP, uridine, uridine nucleotides or uridine-5'-diphosphoglucose administered to groups of rats had no inhibitory effect on the fatty liver induced by D-galactosamine. Plasma triglycerides were similar at 6 and 20 hr after the injection (i.p.) of D-galactosamine, D-glucosamine, or saline. The expected hypertriglyceridemia observed 90 min after the administration of tyloxapol in controls, was markedly reduced at 20 hr in D-galactosamine-treated rats. However, no difference in the response to tyloxapol was detected 6 hr after the i.p. injection of D-galactosamine as compared to i.p. injected controls. Electrophoresis of serum lipoproteins 16 hr after i.p. D-galactosamine showed a marked decrease in beta-lipoproteins as compared to 6 hr after D-galactosamine no change in serum lipoproteins on cellulose polyacetate or paper as compared to controls was observed. Incorporation of ^{14}C-1-leucine into microsomal protein was inhibited by 40% at 4 hr and 57% at 17 hr following D-galactosamine administration, while no inhibition was demonstrable after 2 hr. D-Galactosamine-induced fatty liver is seemingly caused by impaired hepatic lipoprotein release due to inhibition of protein synthesis of the lipoprotein.

7347 REUTILIZATION OF 5-^{125}I-IODO-2'-DEOXYURIDINE AND ^{3}H-THYMIDINE IN REGENERATING LIVER OF MICE.

(E.) Heiniger, H. J. (Jackson Lab., Bar Harbor, Me.), G. Friedrich, L. E. Feinendegen and F. Cantelmo. *Proc. Soc. Exp. Biol. Med.* 137(4):1381-1384, 1971.

Radioactive 5-iodo-2'-deoxyuridine (^{125}IUdR) was reutilized by regenerating mouse liver. Although its uptake was from 10-35 times less efficient than that of tritiated thymidine (^{3}H-TdR), it was nevertheless significant and perceptible in contrast to other proliferating tissues such as bone marrow. With autoradiography, the labeling index (LI) of the hepatocytes in the controls reached 8% for ^{125}IUdR labeled cells and 14% for ^{3}H-TdR labeled cells. From the day of hepatectomy the LI rose to 24 and 64%, resp., at day 4. Whereas, the ^{3}H-TdR LI continued to rise, reaching almost to 90% at day 8, the ^{125}IUdR LI fell sharply. A somewhat similar behavior was reflected in the mean grain counts. In addition to local reutilization, labeled precursors entered the regenerating liver from the intestine through the portal circulation. Precursor supply from immigrated WBC also occurred. Since a bypass of the thymidine kinase salvage pathway is unlikely, incorporation of tracer into the regenerating liver must occur from the nucleoside level.

7348 EFFECTS OF ETHANOL AND TAUROCHOLATE ON BROMSULPHTHALEIN EXCRETION BY THE ISOLATED, PERFUSED LIVER.

(E.) Kendler, J. (Cent. Hosp., Afula, Israel), H. Bassan and H. J. Zimmerman. *Proc. Soc. Exp. Biol. Med.* 137(4):1168-1170, 1971.

A prompt choleresis followed the administration of taurocholate to the perfused untreated rat livers. The rate of bile flow increased from 11 µl/min to a peak 18 µl/min within 10 min, and slowly decreased to 13 µl/min after 45 min of perfusion. Perfusion of livers with ethanol led to a bile flow reduction; however, taurocholate infusion markedly reversed the ethanol-produced cholestasis from low values of 7.8 to a peak flow of 14 µl/min. The choleretic effect of taurocholate was of a short duration when BSP was added to the perfusate of ethanol-treated livers in a single 130 µl/l dose. Livers that were perfused with 250 mM/l concentrations of ethanol excreted little BSP in the bile. Following the perfusion of BSP given as a single load during perfusion with ethanol, the total quantity of BSP in the bile was approximately equal to that in the experiments in which the dye had been slowly infused. The choleretic effect of taurocholate permitted bile flow to continue at an essentially normal rate, despite which an ethanol-induced impairment of BSP excretion could be demonstrated. Apparently, in the presence of ethanol, the biliary BSP transport is largely performed by the bile salt-independent fraction of canalicular bile production.

7349 PASSIVE ROLE OF THE BILE DUCT SYSTEM IN THE DELIVERY OF BILE INTO THE INTESTINE.

(E.) Wakim, K. G. (Mayo Clin., Rochester, Minn.). *Surg. Gynecol. Obstet.* 133(5):826-828, 1971.

The spontaneous and drug-induced activities of perfused, fresh common bile duct segments taken from dogs were recorded, histologic sections were analyzed for muscle content with special stains, and the 2 parameters were compared. Only sparse muscle fibers were observed in the intramural portion of the common bile duct segment after it was stripped out of the duodenal structures surrounding it. The same was true of the segments of the extramural portion of the common bile duct, hepatic ducts and cystic ducts. Drug-induced activity (methacholine, histamine, serotonin) revealed by contraction of the muscles and shortening of the segment, occurred only in the intramural portion of the common bile duct segment where it was surrounded by the duodenal muscle layers. When the duodenal muscle was removed, no biliary segment showed spontaneous or drug-induced activity. Cholecystokinin-pancreozymin had no effect, even on the intramural segment, and epinephrine, norepinephrine and vasopressin injection had no effect on the common bile duct even when it was surrounded with the duodenal muscle layers. Thus, peristaltic activity in the biliary duct system is absent.

7350 METABOLISM OF 1,2-^{3}H-CORTISOL PERFUSED THROUGH HUMAN LIVER IN VIVO. (E.) Wortmann, W. (U. Pennsylvania Sch. Med., Philadelphia), J. C. Touchstone, P. Knapstein, G. Dick and G. Mappes. *J. Clin. Endocrinol. Metab.* 33(4): 597-604, 1971.

The liver of a 38-yr-old-man was injected with 100 μc-1,2-^{3}H-cortisol through the portal vein for 1 min and blood samples were withdrawn from the hepatic vein through a heart catheter at 1,3,5,10 and 20 min intervals. After 5 min 21% of the injected radioactivity had passed the liver while at 10, 15 and 20 min the levels were 43, 60 and 75%, resp. The greatest number of metabolites was found 5 min after ^{3}H-cortisol infusion. The ratio of cortisol to all its metabolites after 5 and 20 min was 0.08 and 0.15, resp. The ratio of conjugated to unconjugated metabolites decreased in the first 5 min and remained constant at 5 and 10 min. The conjugated fraction was mostly glucuronides, and represented 19.8% of the total recovered radioactivity. This fraction contained cortolone and β-cortolone, as well as cortol, present in lower amounts. The tetrahydrocortisol:tetrahydrocortisone ratio in the first 5 min was 1.4, and in the following 15 min, 1.2. These 2 compounds made up the second largest proportion of the conjugate fraction. The ratio between free cortisol and its metabolites in the unconjugated fraction was 0.4. The 20-hydroxy-derivatives were mainly 20 β in the cortisol series while in the cortisone they were 20 α. The percentage of the 20-hydroxyl derivatives in the unconjugated fraction was 0.48 while the 6-hydroxyl derivatives were the second largest proportion in the same fraction. The ratio of 6 hydroxyl derivatives to 20-hydroxyl compounds was 0.38. 11-Hydroxyetiocholanolone was the most abundant 17-ketosteroid metabolite in the conjugated fractions and was present in low amounts in the unconjugated fraction which consisted mostly of 11-oxo- and 11-hydroxyandrosteredione.

7351 INHIBITION OF HEPATIC CHOLESTEROL BIOSYNTHESIS BY 3,5-DIHYDROXY-3,4,4-TRIMETHYL-VALERIC ACID AND ITS SITE OF ACTION. (E.) Hulcher, F. H. (Wake Forest U. Bowman Gray Sch. Med., Winston-Salem, N. C.). *Arch. Biochem. Biophys.* 146(2):422-427, 1971.

An internal Reformatsky reaction was used in the synthesis of 3,5-dihydroxy-3,4,4-trimethylvaleric acid, a compound which markedly inhibited the in vitro synthesis of cholesterol by rat liver homogenates. The racemic mixture of this compound in a concentration of 4×10^{-4} M caused a 50% inhibition of the incorporation of mevalonate-2-^{14}C into cholesterol. In the presence of this compound, mevalonic acid was metabolized to 5-phosphomevalonate, while allylpyrophosphates were not detected, suggesting that the major metabolic inhibition occurred at the second phosphorylation step.

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7445 SHORT PERIOD RHYTHMS OF LIVER GLYCOGEN CONTENT. (E.) Mizell, S. (Indiana U. Dept. Anat., Bloomington), H. Moskow, S. Warren and T. A. Willingham, III. *Comp. Biochem. Physiol.* 39(2A):219-226, 1971.

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7448 VITAMIN D_3 BINDING PROTEIN IN RAT INTESTINAL MUCOSA. (E.) Oku, T. (U. Tokyo Fac. Med.), S. Moriuchi and N. Hosoya. *J. Vitaminol. (Kyoto)* 17(2):81-88, 1971.

Fractionation of the small intestinal mucosa of Sprague-Dawley rats has revealed the presence of vitamin D_3 binding protein in both the cytoplasm and nucleus with sedimentation constants of 13 S and 10 S, resp. The cytoplasmic fraction contained little DNA, while the nuclear fraction contained DNA and little RNA. The 2 fractions could be well differentiated by polyacrylamide gel disc electrophoresis. The binding of vitamin D_3 by both fractions was not affected with equal amounts of cholesterol, 7-dehydrocholesterol, testosterone or 17-β-estradiol. The transport of vitamin D_3 from the cytoplasm into the nucleus occurred at 37°C, but was not observed at 2°C.

7449 EFFECT OF X-IRRADIATION OF THE EXTERIORIZED JEJUNAL LOOP ON THE MORPHOLOGY AND 5-HYDROXYTRYPTAMINE CONTENT OF THE ENTEROCHROMAFFIN CELLS IN THE MOUSE. (E.) Penttilä, A. (U. Helsinki Dept. Forensic Med.) and M. Kormano. *Strahlentherapie* 142(2):238-247, 1971.

The local effects of X-rays (1000 and 3000 r) on the enterochromaffin system was studied in mice with exteriorized jejunal loops using electron microscopy. Whereas 1000 r had no effect on the 5-hydroxytryptamine (5-HT) content of the jejunal loop 8 days after irradiation, a significant reduction of 5-HT content was noted 4 days after exposure to 3000 r. By 4 days after irradiation with 3000 r, most of the enterochromaffin cells (EC) had disappeared leaving only fragmentary fluorescent particles in the totally necrotic jejunal epithelium. The specific enterochromaffin granules of the EC were apparently resistant to either dose of irradiation. However, 3000 r caused destruction of several granules which resulted in fragments with halo formation. The degree of damage to the enterochromaffin granules varied greatly within and between EC's. Thus, the EC's seemingly show the high resistance to X-irradiation characteristic of highly differentiated postmitotic cells, the granules being the most radioresistant cellular structures.

7450 SYNTHESIS AND SECRETION OF LOCAL IMMUNOGLOBULIN BY THE INTESTINAL TRACT OF NEWBORN RABBITS. (E.) Smith, J. W. (VA Hosp., Dallas, Tex.), W. L. Hand and J. P. Sanford. *J. Infect. Dis.* 124(5):494-498, 1971.

The relation between the acquisition of a specific microorganism (Escherichia coli 075) in the intestinal lumen and the immunoglobulin (Ig) response in the intestinal tract as well as the synthesis, localization and secretion of Ig into the intestinal lumen was studied in newborn rabbits. Following a transient 2 week colonization by E. coli, 13 of 14 animals showed IgA present in luminal contents by immunoelectrophoresis. Although IgG was present in serum from all animals, no IgG was found in any luminal samples. Activity of antibody was found in only 2 of these animals, the titer was 1:4, and the antibody was susceptible to 2-mercaptoethanol. Lymphocytes were found in the lamina propria of all animals studied, and were concentrated near the mucosal surface. Fluorescent microscopy of intestinal tissue showed few cells fluorescing with flourescein isothiocyanate (FITC) conjugates of IgA, IgG, and IgM. Most cells were IgA-containing cells. Few IgG-containing cells were found and were located near the muscularis mucosae, while the smaller amounts of IgM-containing cells were located near the mucosa. Synthesis of Ig by the intestinal tract of animals transiently colonized with E. coli was not greater than the noninfected controls and each Ig synthesized was less than 5% of total protein. IgG synthesis was slightly greater than IgA while no change in synthesis of IgG or IgA was found throughout the study. The majority of IgA synthesized was secretory IgA. No specific antibody to E. coli 075 was detected in fractions of IgG or IgA. Intestinal clearance of E. coli does not seem to be related to the production of antibody and IgA is seemingly secreted more efficiently than IgG across the intestinal mucosa.

7451 FRACTIONATION AND CHARACTERIZATION OF β-GALACTOSIDASES FROM HOG SMALL INTESTINE. (E.) Sato, M. (Kyoto U. Fac. Pharm. Sci., Japan) and I. Yamashina. *J. Biochem. (Tokyo)* 70(4):683-692, 1971.

Beta-galactosidases were extracted from acetone powder of hog small intestine and fractionated using hydroxylapatite chromatography and gel filtration. Three types of beta-galactosidase, with different substrate specificities, were found. One of them was classified as a hetero beta-galactosidase and the other 2 as lactase. The hetero beta-galactosidase was separated into numerous forms. One of the lactases appeared to be similar to the previously described lactase-I from human intestine in its substrate specificity, insensitivity to 0.1 mM p-chloromercuribenzoate, pH optimum (5.5-6.0) and behavior on gel filtration. This lactase may be of membranal origin and localized in microvilli; it functions mainly in the digestion of exogenous lactose. The other lactase is unique in that it is the only enzyme among the beta-galactosidases from hog intestine which liberates galactose from sialic acid-free α_1-acid glycoprotein or its glycopeptides, in which most galactose units are linked by β type linkages and are located in the non-reducing termini of the sialic acid-free carbohydrate moieties. This lactase may be of lysosomal origin.

7452 GLYCOLYTIC AND PENTOSE PHOSPHATE PATHWAY ENZYMES IN JEJUNAL MUCOSA, ADAPTIVE RESPONSES TO ALLOXAN-DIABETES AND FASTING IN THE RAT. (E.) Tyrrell, J. B. (VA Hosp., San Francisco, Calif.) and J. W. Anderson. *Endocrinology* 89(5): 1178-1185, 1971.

Alloxan diabetes caused increases in jejunal glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, malate dehydrogenase and supernatant hexokinase activities. However, activities of these enzymes were all reduced in response to a 72-hr fast. Both alloxan diabetes and fasting caused significant reductions in the activity of the above enzymes in liver, with the greatest reductions occurring in glucokinase and malic enzyme activities. Pair feeding or a 24-hr fast reduced the increased mucosal weight of diabetic rats to that of control animals, but jejunal enzyme activity remained similar to control values, suggesting that hyperphagia and mucosal hypertrophy are not the sole causes of the elevated enzyme activity in the diabetic jejunum. Glucose and amino acid absorption are increased in the diabetic intestine; this increased transport function and mucosal energy requirement may result in maintenance of normal or increased activity of the glycolytic and NADPH-generating pathways.

7453 ETHANOL STIMULATES TRIGLYCERIDE SYNTHESIS BY THE INTESTINE. (E.) Carter, E. A. (Harvard Med. Sch., Boston, Mass.), G. D. Drummey and K. J. Isselbacher. *Science* 174(4015):1245-1247, 1971.

Intestinal tissue from rats treated in vivo with either a single acute dose of ethanol (7.5 g/kg) or chronically with ethanol for 28 days showed a significant increase in (1-^{14}C)palmitate incorporation into triglyceride. This was associated with a pronounced stimulation of the microsomal system involved in esterification of palmitate. Direct addition of 2.6% ethanol, an amount comparable to that found in the intestinal lumen of social drinkers, to untreated, normal intestinal slices also produced an increase in the esterification of labeled palmitate. Pyrazole, an inhibitor of alcohol metabolism, when administered in vivo or in vitro, decreased but did not abolish the stimulatory effect of ethanol on microsomal fatty acid esterification. As has been previously suggested, increased lymph•lipids secondary to alcohol intake may contribute to alcohol hyperlipemia and alcohol induced fatty liver.

7454 INCREASED TURNOVER OF INTESTINAL MUCOSAL CELLS OF GERMFREE MICE INDUCED BY CHOLIC ACID. (E.) Ranken, R. (U. Notre Dame Lobund Lab., Ind.), R. Wilson and P. M. Belamear. *Proc. Soc. Exp. Biol. Med.* 138(1):270-272, 1971.

The role of bile acids in regulating the turnover of intestinal mucosal cells was studied in germfree mice fed various bile acids. In animals receiving taurocholic acid and in the control group, the greatest number of radioactively labeled cells appeared in the villi 3 or 4 days after the mice received tritiated thymidine. All labeled cells had disappeared from the villi in these 2 groups at 7 days. In the group given cholic acid the labeled cells reached their greatest number on the villi on the second day and were all gone by the fifth day. The calculated transit time from the crypt to the extrusion from the tip of the villus was 4.4 days in controls and animals fed diets supplemented with taurocholic acid. For those mice receiving cholic acid, the total transit time was 2.1 days, which corresponds to the turnover time in conventional mice. Thus, cholic acid seems to exert a regulatory effect on intestinal mucosal cell turnover.

7455 TEMPERATURE INDUCED CHANGES IN SODIUM TRANSPORT AND Na+/K+ ADENOSINE TRIPHOSPHATASE ACTIVITY IN THE INTESTINE OF GOLDFISH (CARASSIUS AURATUS L.). (E.) Smith, M. W. (ARC Inst. Anim. Physiol., Cambridge, England) and J. C. Ellory. *Comp. Biochem. Physiol.* 39(2A): 209-218, 1971.

7456 THE MICROFLORA OF THE ALIMENTARY TRACT FOLLOWING EXPERIMENTAL TRANSPLANTATION OF THE SMALL INTESTINE. (Rus.) Kirpatovski, I. D., V. V. Khazanova and V. S. Chupiatova. *Eksp. Khir. Anestesiol.* 16(3):15-20, 1971.

7457 COMPARATIVE STUDY OF INTESTINAL DISACCHARIDASES IN THAI AND EUROPEAN SUBJECTS. (E.) Rotthauwe, H. W. (Univ. Pediatr. Clin., Bonn, Germany), D. Emons and M. Kaeoplung. *Klin. Wochenschr.* 49(8):503-504, 1971.

7458 RNA METABOLISM IN RAT INTESTINAL MUCOSA OF NORMAL AND VITAMIN A DEFICIENT RATS. (E.) De Luca, L. (Massachusetts Inst. Technol., Cambridge), H. K. Kleinman, E. P. Little and G. Wolf. *Arch. Biochem. Biophys.* 145(1):332-337, 1971.

7459 INTESTINAL GLYCOPROTEINS OF GERMFREE RATS. CHEMICAL COMPOSITION OF INTESTINA AND FECAL MUCUS FROM GERMFREE RATS FED A CHEMICALL DEFINED DIET. (E.) Wold, J. K. (U. Oslo Inst. Pharmacol., Norway), R. Khan and T. Midtvedt. *Acta Pathol. Microbiol. Scand.* [*B*] 79(4):525-530, 1971.

7460 NUTRITIONAL RESPONSE TO FEEDING L PHENYLLACTIC, SHIKIMIC AND D QUINIC ACIDS IN WEANLING RATS. (E.) Seifter, E. (Albert Einstein Coll. Med., Bronx, N. Y.), G. Rettura and D. Reissman. *J. Nutr.* 101(6):747-754 1971.

7461 COPPER CONTENT OF HUMAN ALIMENTARY SECRETIONS. (E.) Gollan, J. L. (Royal Adelaide Hosp., Australia), P. S. Davis and D. J. Deller. *Clin. Biochem.* 4(1):42-44, 1971.

7462 FIBRINOLYTIC AND PROTEOLYTIC ACTIVITY IN THE RAT. HISTOCHEMICAL LOCALIZATION IN SALIVARY GLANDS, PANCREAS, AND LIVER. (E.) Myhre Jensen, O. (James F. Mitchell Found. Inst. Med. Res., Washington, D. C.), B. A. Baetz and T. Astrup. *Arch. Pathol.* 91(6):515-522, 1971.

7463 RESPONSE OF RAT GASTROINTESTINAL TRACT PENTOSE CYCLE DEHYDROGENASE SYSTEMS TO WHOLE-BODY IONIZING IRRADIATION. (E.) Kivy-Rosenberg, E. (Jersey City State Coll., N. J.). *Int. J. Radiat. Biol.* 20(4):315-324, 1971.

7464 ULTRASTRUCTURAL AUTORADIOGRAPHY FOR ELUCIDATION OF THE METABOLISM OF THE BIOGENIC AMINES IN THE GASTROINTESTINAL TRACT AND IN OTHER ORGANS. (Ger.) Forssmann, W. G. (U. Heidelberg Inst. Anat., Germany), P. Wacker and J. Daldrup. *Verh. Anat. Ges. (Jena)* 65:19-29, 1971.

7465 BLOOD LIPIDS IN NORMALS. (E.) Leren, P. (Univ. Med. Sch., Oslo, Norway) and O. Haabrekke. *Acta Med. Scand.* 189(6):501-504, 1971.

7466 THE EFFECT ON RABBIT INTESTINAL MICROFLORA OF DIETS WHICH INFLUENCE SERUM CHOLESTEROL LEVELS. (E.) Fuller, R. (Natl. Inst. Res. Dairy, Shinfield, Reading, England) and J. H. Moore. *Lab. Anim.* 5(1):25-30, 1971.

7467 THE EFFECT OF RHYTHMIC MECHANICAL VIBRANT STIMULATION OF THE GALLBLADDER ON THE BIOELECTRIC ACTIVITY OF SKELETAL MUSCLES. (Rus.) Shchezhin, V. A. (Inst. Sanit. Med. Hygiene, Leningrad, USSR). *Fiziol. Zh. SSSR* 57(7):982-987, 1971.

7468 FOUR HOURS PRESERVATION OF PORCINE LIVER BY SIMPLE HYPOTHERMIA. TRANSPLANTATION AND BIOCHEMICAL RESULTS. (Ger.) Lie, T. S. (Univ. Surg. Clin., Bonn, Germany), E. Struck and H. U. Homoth. *Z. Gesamte Exp. Med.* 155(3):211-224, 1971.

7469 REGIONAL DIFFERENCES IN PLEURAL AND ESOPHAGEAL PRESSURES IN HEAD UP AND HEAD DOWN POSITIONS. (E.) Coulam, C. M. (Mayo Clin., Rochester, Minn.) and E. H. Wood. *J. Appl. Physiol.* 31(2):277-287, 1971.

7470 EFFECT OF DURATION OF STIMULUS ON IODIDE CONCENTRATION IN HUMAN PAROTID SALIVA. (E.) Stephen, K. W. (Western Infirm., Glasgow, Scotland), R. M. Harden and D. K. Mason. *Arch. Oral Biol.* 16(6):581-586, 1971.

7471 THE EFFECTS OF CASTRATION ON THE ULTRASTRUCTURE AND THE IODIDE CONCENTRATING ABILITY OF MOUSE SUBMAXILLARY SALIVARY GLANDS. (E.) Rogers, A. W. (MRC Neuroendocrinol. Unit, Oxford, England) and K. Brown Grant. *J. Anat.* 109(1):51-62, 1971.

See also numbers: 7203, 7204, 7647, 7655, 7658

7472 INFLUENCE OF PROLONGED STIMULATION ON THE COMPOSITION OF A SALIVARY SULFATED GLYCOPROTEIN IN MAN. (E.) André, C., R. Lambert (E. Herriot Hosp., Lyon, France) and A. Bèrard. *Digestion* 4(5):257-263, 1971.

The effect of betazole on the composition of the sulfated salivary glycoprotein (SGP) was studied in 18 patients undergoing gastric secretory tests, by determining the fucose, galactose and sulfate in sulfated salivary glycoprotein under basal and stimulated conditions. In saliva from patients who did not receive a betazole injection, a significant decrease in the secretion of sulfated salivary glycoprotein as indicated by a fall in the concentration of fucose, galactose and sulfate was noted. In patients receiving an injection of betazole (1.5 mg/kg), the decrease in the concentration of sulfated salivary glycoprotein was more pronounced than in the former group. The fall in sulfate was not marked and a significant variation in molar ratios indicated a relative desulfatation of the glycoprotein; the ratio of fucose to sulfate changed from 2.4 to 7.8 while the fucose to galactose ratio did not vary. Exhaustion of the salivary glands under the prolonged action of the stimulant sound seems to account for the decrease in sulfated salivary glycoprotein secretion.

7473 EFFECT OF JEJUNAL AMINO ACID PERFUSION AND EXOGENOUS CHOLECYSTOKININ ON THE EXOCRINE PANCREATIC AND BILIARY SECRETIONS IN MAN. (E.) Ertan, A., F. P. Brooks (U. Pennsylvania Hosp., Philadelphia), J. D. Ostrow, D. A. Arvan, C. N. Williams and J. J. Cerda. *Gastroenterology* 61(5):686-692, 1971.

The effects of jejunal perfusion with a mixture of amino acids (MAA) and continuous i.v. infusion of cholecystokinin-pancreozymin (CCK) on the secretory response in duodenal aspirates were compared on different days in 15 healthy volunteers. Amino acid perfusion induced a prompt and marked increase in secretory volume, compared to that obtained with CCK. Bicarbonate output increased with both amino acids and CCK, but the response to amino acids was less marked. Both amino acids and CCK stimulated comparable increases in trypsin and protein outputs due to increases in concentration as well as volume. All measured components of pancreatic secretion reached peak values at 30 to 45 min after stimulation and fell to a sustained plateau during the second hr. The outputs fell sharply during the first 30 min after the stimulation was stopped. Both amino acid perfusion and CCK infusion produced increased total bile salt output during the first hr. During the second hr the bile salt response to CCK was not sustained while the total bile salt elevation remained in response to amino acids. Jejunal amino acid perfusion seemingly releases endogenous CCK and is as effective a pancreatic secretion stimulus as i.v. CCK infusion, and indicating that physiological concentrations of amino acids in the proximal jejunum may act as an important factor in the regulation of exocrine pancreatic and biliary secretions.

7474 SALIVARY EXPRESSION OF TASTE RESPONSE TO CHEMICAL STIMULATION. (E.) Makhlouf, G. M. (Med. Coll. Virginia, Richmond) and A. Blum. *Scand. J. Gastroenterol.* 6(6): 523-526, 1971.

Duplicate salivary responses to 6 concentrations of citric acid were obtained from 17 subjects. Adequate reproducibility was achieved by this technique at all flow levels and for each concentration used. In each subject response increased with the concentration of acid; responses in the 2 sexes were identical when expressed per kg body weight. The relation between salivary response and the molar concentration of the stimulant acid was described by an expression that was analagous to Michaelis-Menten kinetics. The technique could be extended to the study of various stimulants and used to explore the mechanism of taste perception in man.

7475 - DO PRECAPILLARY SPHINCTERS RESPOND TO VASOACTIVE SUBSTANCES IN AN ALL-OR-NONE MANNER? (E.) Altura, B. A. (Albert Einstein Coll. Med., Bronx, N. Y.). *Proc. Soc. Exp. Biol. Med.* 138(1):273-276, 1971.

In vivo experiments, using the rat mesentery and a high magnification (up to 6500 times) image-splitting television microscope recording system, were designed to investigate the response of precapillary sphincters to vasoactive substances. Topical application of epinephrine, norepinephrine and dopamine (0.1 ml volumes) in increasing doses, resulted in dose-dependent contractile responses which were not an all-or-none phenomenon. These vessels were quantitatively more sensitive to epinephrine and norepinephrine than heretofore believed, responding to threshold doses of 10^{-5}-10^{-4} μg/ml. Precapillary vessels were about 500-1000 times more sensitive to the catecholamine constrictor actions than were the arterioles. Although precapillary sphincters could contract to closure in a graded fashion to dopamine, they were relatively insensitive to this catecholamine. Apparently, precapillary sphincters, where they exist, are able to regulate transcapillary exchange very finely by changing capillary pressure and blood flow more actively than is currently believed.

7476 GASTRO-INTESTINAL AND BILIARY BIOPOTENTIALS FOLLOWING VARIOUS FORMS OF VAGOTOMY. (E.) Nana, A. (Inst. Med. Pharm., Cluj, Rumania), C. Mircioiu, E. Neumann and M. Nana. *Digestion* 4(5):269-280, 1971.

The effect of selective and total vagotomy on the electrical activity of the gastrointestinal tract and the biochemistry of gallbladder bile was studied in dogs. After bilateral total vagotomy, there was a lack of electrical response throughout the whole distribution area of the abdominal vagus nerves, while after anterior selective and posterior total vagotomies no disturbances of the electrical activity were noted in the biliary zones. After posterior selective and anterior total vagotomies a lack of response was observed in the antral zones and in the biliary tree with the preservation of the electrical activity in the intestinal segment. Bilateral selective vagotomy caused an exclusive elimination of the gastric area from the context of response to various stimulations. Whereas increases of dry residue, biliary pigments and cholesterol were observed in gallbladder bile after anterior total and bilateral total vagotomies, after bilateral selective and posterior selective vagotomies pancreatic enzymes increased 30 min after stimulation with physostigmine. In rats, the content of bacteria in the upper jejunum increased 2-3 times control values after all procedures except posterior selective vagotomies. Thus, the use of selective vagotomies in the surgical treatment of duodenal ulcer seems to have some advantages over total procedures.

7477 THE INFLUENCE OF ABO BLOOD GROUPS, SECRETOR STATUS AND FAT INGESTION ON SERUM ALKALINE PHOSPHATASE. (E.) Walker, B. A. (U. Liverpool Dept. Med., England), L. C. Eze, M. C. K. Tweedie and D. A. Price Evans. *Clin. Chim. Acta* 35(2):433-444, 1971.

The relationship between the serum alkaline phosphatase isoenzymes and the ABO secretor phenotypes was examined in 24 healthy volunteers both fasting and in response to fat ingestion. The 6 O secretor subjects showed 2 clear bands in all the serum samples in terms of the electrophoretic pattern of alkaline phosphatase as compared to the 1 clear band demonstrated by the other 18 subjects. The fasting values from 24 subjects, showed the 12 males to have a higher mean total alkaline phosphatase value than the 12 females. Data obtained 2 hr after a non-fatty meal deducted from values obtained 2 hr after a fatty meal showed no sex difference in terms of the effect of fat on the total alkaline phosphatase. The effect of fat on a 4 hr meal also showed no sex difference. The differences in total alkaline phosphatase values were due to an effect of fat in O secretor subjects which was not present in the other 3 phenotypes. O secretor subjects showed consistently higher values of inhibition of alkaline phosphatase activity by L-phenylalanine than the other 3 phenotypes and this inhibition was not affected by the ingestion of fatty or non-fatty food. Total serum alkaline phosphatase, L-phenylalanine and urea inhibition were determined during fasting and 7-1/2 hr after a fat meal. Much variation was found among O secretors as the effect of fat in elevating total serum alkaline phosphatase was more marked in some subjects than in others and indicated that the contribution of the intestinal isoenzyme remained constant. Alkaline phosphatase appears to be influenced similarly in both liver and intestine by the O and secretor genes.

7478 HYBRIDIZATION OF GUINEA PIG ANTI-FERRITIN AND ANTI-RABBIT INTESTINAL SUCRASE. (E.) Knüsel, A. (Univ. Pediatr. Dept., Zurich, Switzerland). *Pathol. Microbiol. (Basel)* 37(5):337-346, 1971.

Guinea pig immunoglobulin G directed against ferritin and against rabbit intestinal sucrase was treated with pepsin. The resulting F $(ab')_2$ fragments were than reduced to Fab' and recombined to yield hybrid antibody. Considerably higher (5 times) concentrations of 2-mercaptoethylamine were needed for the complete reduction of F $(ab')_2$ to Fab' in the guinea pig as compared to the rabbit. The above occurs because the guinea pig immunoglobulin G possesses 3 interheavy chain disulfide bridges located probably on the F $(ab')_2$ fragment. Attempts at recombination of Fab' fragments which had stayed unrecombined after the standard procedure were unsuccessful. Apparently the higher 2-mercaptoethylamine concentrations used here, by causing intrachain disulfide bond reduction, lead to irreversible disorganization of molecules. Proof of hybridization was the demonstration of increased precipitation capacity of the recombined $F(ab')_2$ with both antigens present. The hybrids were capable of combining with the tissue antigen (rabbit sucrase) and of the consecutive capture of ferritin.

7479 AN INTEGRATED PROCEDURE FOR THE RAPID DIAGNOSIS OF BILIARY OBSTRUCTION, PORTAL HYPERTENSION AND LIVER DISEASE OF UNCERTAIN ETIOLOGY. (E.) Strack, P. R. (Jacobi Hosp., Bronx, N. Y.), H. K. Newman, A. G. Lerner, S. H. Green, C.-H. Meng, L. R. M. Del Guercio and D. State. *N. Engl. J. Med.* 285(22):1225-1231, 1971.

Transhepatic cholangiography, liver biopsy and omentoportography were performed under local anesthesia through a 5-cm subxiphoid incision in 100 patients with hepatobiliary disorders. Although diagnosis was established in every case, success rates for individual components of the procedure varied slightly. Open transhepatic cholangiography was successful in 80 of 91 attempts, including all 59 patients with obstructed ducts. Omentoportography provided portal visualization and manometrics in 13 of 15 attempts, and open Vim-Silverman needle liver biopsy provided sufficient tissue for pathologic evaluation in each of 54 attempts. Frequency of 2 of the 3 major complications that occurred should be reducible by suture ligation of puncture sites. The 1 bleeding complication in 29 patients with substantial coagulation abnormalities was attributed to a subsequently corrected technical deficiency. There were no known contraindications except hypersensitivity to contrast material. In 3 cases of drug-induced cholestasis versus extrahepatic biliary obstruction simultaneous open transhepatic cholangiography and liver biopsy were performed. Interpretation of the biopsy was nonspecific. However, the demonstration of normal ductal systems by the cholangiography was diagnostic of drug-induced cholestasis.

7480 ABDOMINAL TAP. INDICATION, TECHNIC, AND RESULTS. (E.) McCoy, J. and F. J. Wolma. *Am. J. Surg.* 122(5):693-695, 1971.

Abdominal tap or paracentesis is indicated in all patients with combined abdominal and major head injuries in which there is a doubt about the extent of intra-abdominal injuries. Precautions include: avoiding areas of the inferior epigastric vessels, the liver, spleen and kidneys (upper quadrants), and emptying the urinary bladder, especially if lower midabdomen is used. A grossly positive abdominal tap in abdominal trauma consists of 0.5 ml or more of nonclotting blood, bile stained fluid, air or intestinal contents. Any of these findings would be strongly in favor of immediate exploratory laparotomy. A review of 271 patients with blunt or penetrating abdominal injuries at Texas Medical Branch Hospitals from 1959-1969 showed that 81 of these patients had abdominal taps. Nine taps gave false-negative results, yielding an 89% rate of accuracy. In a group of 161 patients with blunt trauma there were 5 negative taps giving an accuracy rate of 91.4%.

7481 THE MEASUREMENT OF THE SYNTHETIC RATE OF BILIRUBIN FROM HEPATIC HEMES IN PATIENTS WITH ACUTE INTERMITTENT PORPHYRIA. (E.) Jones, E. A. (Roy. Free Hosp., London), J. R. Bloomer and N. I. Berlin. *J. Clin. Invest.* 50(11):2259-2265, 1971.

A new method is described for the direct measurement of the rate of bilirubin synthesis from hepatic hemes in vivo. The method involves the biosynthetic labeling of porphobilinogen and bilirubin after an i.v. injection of δ-aminolevulinic acid-4-^{14}C. This method depends on the satisfaction of 2 conditions: that the labeled compound is not incorporated to any significant extent into the developing RBC; that hepatic porphobilinogen is a common precursor of both urinary porphobilinogen and hepatic-synthesized bilirubin. The portion of total bilirubin production derived from hepatic hemes is calculated from the ratio of the mean ^{14}C specific activities of fecal stercobilinogen and urinary porphobilinogen. Using this method in 3 patients with acute intermittent porphyria, the values obtained for the rate of synthesis of bilirubin from hepatic hemes were 13.3%, 15.8% and 20.7%.

7482 CLINICAL EVALUATION OF FIBREOPTIC SIGMOIDOSCOPY EMPLOYING THE OLYMPUS CF-SB COLONOSCOPE. (E.) Salmon, P. R. (U. Bristol Dept. Med., England), R. A. Branch, C. Collins, H. Espiner and A. E. Read. *Gut* 12(9): 729-735, 1971.

The Olympus CF-SB colonoscope, a flexible fiberoptic endoscope, was used to examine 51 patients with disease of the large intestine, following bowel preparation, sedation and analgesia using a variety of drugs in 26 examinations premixed nitrous oxide and oxygen (Entonox) applied by self-administration was used. Entonox proved superior to other agents in degree of analgesia, patient cooperation, and in amount of bowel which could be examined. Of 26 patients receiving 50/50 nitrous oxide/oxygen, 23 found relief of previous discomfort and revealed no cardiac arrythmias. The extent and length of bowel examined was markedly greater with fiberoptic colonoscopy and enhanced even further by Entonox, as compared to conventional proctosigmoidoscopy and non-inhalation analgesics. The average time taken to complete these examinations was 30 min. Colonoscopic findings in 6 patients with equivocal barium enema radiologic findings established the nature of the suspected lesion. Of 48 biopsies taken from 21 patients, 6 of 9 cases of polyps were seen endoscopically and of the initial 51 cases with large intestine disease 12 (23.3%) were diagnosed by colonoscopy alone. Fiberoptic colonoscopy seems indicated in the diagnosis of rectal bleeding, the search for polyps and as an aid in the interpretation of equivocal radiographs and, with proper patient preparation, represents a major advance in the investigation of large intestine disease.

7483 SERUM ALDOLASE IN TAY-SACHS DISEASE AND IN FRUCTOSE INTOLERANCE.

(E.) Hue, L., F. Van Hoof and H.-G. Hers (U. Leuven Physiol. Chem. Lab., Belgium). *Am. J. Med.* 51(6):785-787, 1971.

The aldolase activities measured in the serum of 8 patients with Tay-Sachs disease or of carriers (8 parents of the patients) did not differ significantly from values obtained in the 38 control children and 36 normal adults. The fructose 1-phosphate aldolase activity in the serum of children intolerant to fructose was slightly smaller than the mean value for normal children. This decrease is in agreement with the known alteration of hepatic aldolase in the patients. However, large overlap of values between normals and fructose intolerant patients prevents the use of this assay as a diagnostic tool. Previous results have shown that the diagnosis of Tay-Sachs disease can be established on the basis of the activity of serum hexosaminidase.

7484 ENZYME DIAGNOSIS IN HEPATIC DISEASE.

(E.) Coodley, E. L. (Hahnemann Med. Coll., Philadelphia, Pa.). *Am. J. Gastroenterol.* 56(5):413-419, 1971.

A battery of liver tests, both organ-specific enzymes and more general enzymes, was employed to study 174 patients with acute hepatitis, active cirrhosis, and other conditions. Acute hepatitis showed marked elevation in guanase, aldolase, isocitric dehydrogenase, and the transaminases (especially SGPT). Differentiation between cirrhosis and hepatitis was not aided by the leucine aminopeptidase, and in the case of aldolase there was considerable overlap. False positive elevation of guanase was infrequently observed and this enzyme proved quite specific for hepatitis. Guanase and isocitric dehydrogenase appeared superior in their high incidence of positive reactions in hepatitis combined with their low incidence of positive reactions in cirrhosis. Guanase was infrequently elevated in the miscellaneous diseases including carcinoma, common bile duct calculus, and sickle cell disease. The employment of organ-specific enzymes (guanase and isocitric dehydrogenase) rather than the commonly used liver enzymes may be more useful in differentiating viral hepatitis from active cirrhosis or related conditions.

7485 COMMERCIAL BILIRUBIN: A TRINITY OF ISOMERS.

(E.) McDonagh, A. F. (U. California Dept. Med., San Francisco) and F. Assisi. *FEBS Lett.* 18(2):315-317, 1971.

Qualitative examination of bilirubin samples from 15 different commercial sources by analytical thin-layer chromatography and quantitative analysis of 5 of these by preparative thin-layer chromatography indicated the presence of other than the IX-α isomer in most of these samples ranging from trace amounts to as much as 16% III-α:62% IX-α:22% XIII-α for 1 of the samples.

7486 A COMPARATIVE STUDY OF CONVENTIONAL PREMEDICATION (PETHIDINE, PROMETHAZINE, AND ATROPINE) AND NEUROLEPTANALGESIA (DROPERIDOL AND PHENOPERIDINE) FOR PERORAL ENDOSCOPY.

(E.) Reed, W. D., B. E. Hopkins, R. A. Joske (U. Western Australia Dept. Med., Perth) and B. H. Laurence. *Gut* 12(9):736-738, 1971.

Premedication for peroral endoscopy with pethidine (100 mg), promethazine (25 mg), and atropine (0.6 mg) were compared with the neuroleptanalgesic combination of phenoperidine (2 mg) and droperidol (5 mg) using a double blind technique in 70 patients. There was no significant difference between conventional premedication and neuroleptanalgesia with regard to the suitability of the patients for endoscopy or the response of the patient to the procedure. The endoscopists found mild difficulty in a greater proportion (38%) of patients receiving the neuroleptanalgesic combination than in those who received the pethidine-promethazine-atropine combination (15%). The majority (83%) of the patients receiving neuroleptanalgesia fully remembered the procedure; however, the patients so premedicated showed a slight prominence of anxiety and discomfort.

7487 A NOVEL METHOD FOR DETECTING INTESTINAL METAPLASIA OF THE STOMACH WITH TES-TAPE.

(E.) Sugimura, T. (Natl. Cancer Ctr. Res. Inst., Tokyo), T. Kawachi, N. Kogure, N. Tanaka, S. Kazama and Y. Koyama. *Gann* 62(3):237, 1971.

After surgical excision, the surfaces of human stomachs were washed and dried with filter paper and sprayed with a 5% solution of sucrose. The mucosa was incubated at 37° C for 5 minutes and the whole surface was then covered with pieces of Tes-Tape. Pieces over areas producing sucrase turned green due to the presence of glucose. The presence of sucrase in the stomach correlated well with the presence of intestinal metaplasia. Color photographs from 2 positive cases are included.

7488 THE RED CELL PEROXIDE HEMOLYSIS TEST IN THE DIFFERENTIAL DIAGNOSIS OF OBSTRUCTIVE JAUNDICE IN THE NEWBORN PERIOD.

(E.) Lubin, B. H., R. L. Bahner, E. Schwartz, S. B. Shohet and D. G. Nathan. *Pediatrics* 48(4):562-565, 1971.

In 23 children with obstructive liver disease, 16 had surgically proven biliary atresia with the diagnosis established by 4 months of age and 7 had neonatal hepatitis (5 diagnosed by laparotomy). Both the RBC hydrogen peroxide hemolysis test and the ^{131}I-rose bengal excretion tests were abnormal in all 16 with biliary atresia. In the cases of neonatal hepatitis, the RBC peroxidase hemolysis test was normal in 3, abnormal in 1, and abnormal, becoming normal in 3, while the rose-bengal excretion test was normal in 1, abnormal in 5, and abnormal, becoming normal in 1. In evaluation of obstructive jaundice in infants, the authors stress the simplicity, reliability and ease of repetition of the RBC hydrogen peroxide hemolysis test.

7489 FINE-NEEDLE ASPIRATION BIOPSY SMEARS IN THE DIAGNOSIS OF LIVER DISEASES. (E.) Johansen, S. (Ulleval Hosp., Oslo, Norway) and J. Myren. *Scand. J. Gastroenterol.* 6(7):583-588, 1971.

One hundred and three blindly coded fine needle aspiration biopsy smears were stained by the May-Grunwald-Giemsa's method and examined independently by 2 investigators by light microscopy. Complete agreement or slight disagreement as to classification occurred in a high percentage for all variables, the highest being observed for the grading of vacuolization, granulation and bile accumulation. Six cases of liver cancer were correctly recognized; 2 of 5 primary carcinomas and 4 of 7 metastatic cancers were diagnosed. High degrees of cytological alterations were observed in smears from patients both with acute and chronic liver diseases at about similar rates. Complications were not observed. Correlation between clinical diagnoses and the cytological alterations did not show any characteristic profile.

7490 GAS-LIQUID-CHROMATOGRAPHIC DETERMINATION OF BILE ACIDS IN BILE. (E.) Klaassen, C. (U. Kansas Med. Ctr., Kansas City). *Clin. Chim. Acta* 35(1):225-229, 1971.

A gas chromatograph equipped with a flame ionization detector was used for the simultaneous determination of lithocholic, deoxycholic, chenodeoxycholic, and cholic acid in bile using 7-ketolithocholic acid as an internal standard. The procedure is rapid and accurate. Results are reproducible in the quantitative determination of bile acids. This method can be used to measure bile acids in plasma as well as in bile. To obtain qualitative information on which conjugate (taurine or glycine) is present, the Hoffmann thin-layer chromatography method must also be used. Up to 30 samples of bile can be analyzed by a technician in a day.

7491 USEFULNESS OF SCINTILLATION CAMERA AND ^{131}I-ROSE BENGAL IN EVALUATING LIVER AND GALLBLADDER FUNCTIONS. (E.) Torizuka, K. (Kyoto U. Sch. Med., Japan), K. Hamamoto, M. Fujii, T. Mori, R. Morita, T. Mukai, T. Kousaka, K. Itoh, J. Nakagawa and C. Minaguchi. *Jap. J. Nucl. Med.* 8(2):90-102, 1971.

Six normal subjects, 4 with acute hepatitis, 19 with chronic hepatitis, 7 with cirrhosis, 3 with extrahepatic obstructive jaundice, 3 with space-occupying lesions of the liver and 4 with gallbladder disease were injected i.v. with ^{131}I-Rose Bengal. A scintillation camera and 1600 channel recorder were used to scan the liver and calculate the rate of uptake of the label. Exposures were made at 3-min intervals for 90 min. The maximum hepatic uptake occurred at 30 min in normals, at 30-70 min in acute hepatitis, at 30-60 min (mean 45 min) in chronic hepatitis, at 45-60 min in cirrhosis, at more than 90 min with extrahepatic obstruction, at 45-60 min with hepatic tumors and at 30-75 min with cholelithiasis. There was a good correlation between these times and the excretion of sulfobromophthalein at 45 min. In these groups, label appeared in the gallbladder in 30, 15-30, 150, 15-60, more than 90 and 30-45 min, resp., and in the bowel in 50-75, 30-100, 90, 90, more than 90, 90 and 30-70 min, resp. The percentage of hepatic uptake of label was 7-10.5%, 5-8%, 3-8.5%, 2.8-3.5%, 2-5%, 3.9-6.7% and 3.3-8.7%, resp.

7492 DETERMINATION OF INTESTINAL ALKALINE PHOSPHATASE IN SERUM BY SUBSTRATE-SPECIFICITY MEASUREMENTS. (E.) Moss, D. W. (Roy. Postgrad. Med. Sch., London). *Clin. Chim. Acta* 35(2):413-419, 1971.

A comparison of 3 substrates (o-carboxyphenyl phosphate, thymolphthalein monophosphate and phenyl phosphate) for their rates of hydrolysis is reported as a means of estimating the amount of intestinal and non-intestinal alkaline phosphatase present in human blood serum. The dependence of reaction velocity on the concentration of thymolphthalein monophosphate and o-carboxyphenyl phosphate was similar in form for both human intestinal and liver alkaline phosphatases. For each substrate, the ratio of the rates at which they were hydrolyzed by the 2 alkaline phosphatase enzymes was independent of the substrate concentration. The relative rates of hydrolysis of thymophthalein monophosphate and phenyl phosphates by a placental alkaline phosphatase were similar to those observed with the intestinal isoenzyme. O-Carboxyphenyl phosphate exhibited slow hydrolysis rates and low sensitivity of measurement which together reduced the reproducibility of estimates of enzyme activity. Therefore, investigations of relative substrate specificity of normal and pathological sera were confined to measurements of the thymolphthalein monophosphate:phenyl phosphate ratio. Ratios of these 2 substrate activities were determined for 84 sera, 37 of which had a normal total phenyl phosphatase activity. The alkaline phosphatase of serum samples with elevated activities was classified as bone, liver or intestinal origin by starch gel-electrophoresis. Thirty sera contained mostly liver phophatase, 7 bone phosphatase and

10 showed a distinct zone corresponding to the intestinal isoenzyme by this criterion. The results confirm the studies using electrophoresis in indicating that an appreciable amount of the normal activity of alkaline phosphatase in serum is contributed by the intestinal isoenzyme and the simplicity and high precision of the thymolphthalein monophosphate method for determination of total alkaline phosphatase activity is indicated.

7493 EVALUATION OF CHROMOGENS SUITABLE FOR OCCULT BLOOD IN FAECES. (E.) Deadman, N. M. (West Wales Gen. Hosp., Carmarthen). *Clin. Chim. Acta* 35(2):273-276, 1971.

The effect on various chromogens (o-toluidine, guiacum, dichlorophenol-indophenol, dimethyl naphthidine, phenolphthalein, N,N-dimethyl-p-phenylenediamine-monohydrochloride and tetramethyl-p-phenylene diamine dihydrochloride) by normal diet, therapeutically used iron, chlorophyll, meat and fish is discussed. The investigations carried out showed conclusively that it was essential to keep patients on a meat- and fish-free diet for 2-3 days before collecting stools for occult blood testing. False positives due to chlorophyll and plant peroxidases were largely removed by boiling the fecal suspension before testing and it would be essential to keep patients off green vegetables as well if any filter paper techniques were to be used. Iron compounds gave false positives in vivo with all the chromogens tested except dimethyl naphthidine. The omission of iron from the diet when using the other chromogens was overcome by the use of ether extraction. The normal diet gave false positives with all chromogens although the dimethyl naphthidine and guiacum techniques were least affected. The sensitivity of any of the techniques was easily varied by altering the chromogen concentration and the amount of fecal suspension used. The dimethyl naphthidine test tube and guiacum filter paper techniques were recommended, the former being the more advisable.

7494 A SIMPLIFIED PREPARATION REGIMEN FOR BARIUM ENEMA EXAMINATION. (E.) Meyers, P. H. (Tulane U. Sch. Med., New Orleans). *J. La. State Med. Soc.* 123(6):203-206, 1971.

7495 ERRORS IN THE DIAGNOSIS OF ACUTE APPENDICITIS IN CHILDREN. (Rus.) Brey, V. P. *Klin. Khir.* 51(6):69-70, 1971.

7496 CYTOLOGICAL DIAGNOSIS OF SO CALLED ATYPICAL EPITHELIUM OF THE STOMACH. (Jap.) Tsukioka, T. (Gunma U. Sch. Med., Maebashi, Japan). *Kitakanto Igaku (Kitakanto Med. J.)* 21(1):42-43, 1971.

7497 DIAGNOSTIC USEFULNESS OF RECTAL BIOPSY. (E.) Dobbins, W. O., III (George Washington U. Med. Ctr., Washington, D. C.). *Med. Ann. DC* 40(4):223-226, 1971.

7498 THE USE OF SENNA TO ACCELERATE TRANSIT IN THE SMALL INTESTINE FOR RADIOLOGY IN THE HOSPITAL. (Fr.) Fourner, A. M. *Marseille Med.* 108(6):469-474, 1971.

7499 THE ROLE OF HYPOTONIC DUODENOGRAPHY IN THE DIAGNOSIS OF INFLAMMATORY AND NEOPLASTIC LESIONS OF THE HEAD OF THE PANCREAS. (E.) Galanti, A. (U. Malaya, Hosp., Kuala Lumpur) and W. W. Kwan. *Med. J. Malaya* 25(3):198-204, 1971.

7500 COMPARISON BETWEEN STEREOMICROSCOPIC AND HISTOLOGICAL FINDINGS ON INTESTINAL VILLI BY BIOPSY. (Jap.) Yamagata, S. (Tohoku U. Sch. Med., Sendai, Japan), G. Yamagishi and T. Sugawara. *Naika* 27(2):299-306, 1971.

7501 THE ENDOSCOPIC EXAMINATION OF THE STOMACH. (Dan.) Bisgaard Pedersen, A. (Bispebjerg Hosp., Copenhagen). *Nord. Med.* 86(27):827-829, 1971.

7502 INFUSION CHOLANGIOGRAPHY. (Pol.) Zgliczynski, S. L. (Med. Acad. Inst. Roentgenol. Warsaw, Poland) and L. Lazecki. *Pol. Przegl. Radiol. Med. Nukl.* 35(3):295-300, 1971.

7503 VALUE OF CHOLECYSTOKININ FOR INTERPRETATION OF THE OPERATIVE CHOLANGIOGRAPHIC APPEARANCES OF THE DISTAL THIRD OF THE COMMON BILE DUCT (PRELIMINARY REPORT). (Sp.) Aguirre, C. (Natl. U. 1st Dept. Clin. Surg., Cordoba, Argentina), M. Halabi, A. H. Giffoniello and R. M. Areal. *Prensa Med. Argent.* 58(17):853-857, 1971.

7504 ANGIOGRAPHIC METHODS IN THE DIAGNOSIS OF HEPATIC HEMANGIOMA. (Sp.) Gilsanz, V. (San Carlos Hosp. Clin., Madrid), B. Gomez and Marazuela. *Prensa Med. Argent.* 58(8):390-398, 1971.

7505 EMERGENCY ENDOSCOPY IN GASTROENTEROLOGY. (Fr.) Dupuy, P. (Ambroise Pare Hosp., Boulogne, France) and J. Coulbois. *Rev. Prat. (Paris)* 21(15):2615-2623, 1971.

7506 CLINICAL AND DIAGNOSTIC SIGNIFICANCE OF DETERMINATION OF THE ORNITHINE CARBAMINOYL TRANSFERASE ACTIVITY OF THE BLOOD SERUM IN PATIENTS WITH INFECTIOUS HEPATITIS AND JAUNDICE OF DIFFERENT ETIOLOGY. (Rus.) Melk, M. V., L. A. Mikhailovskaia and A. I. Gundalakh. *Ter. Arkh.* 43(5):73-75, 1971.

7507 AORTOGRAPHY AND ARTERIOGRAPHY IN THE DIAGNOSIS OF ABDOMINAL DISEASES. (Rus.) Prokubovskiĭ, V. I. and A. A. Kudinov. *Khirurgiia (Mosk.)* 47(5):57-61, 1971.

7508 SEROLOGICAL STUDIES IN PATIENTS WITH ALCOHOLIC LIVER DISEASE AND THEIR SIGNIFICANCE FOR DIFFERENTIAL DIAGNOSIS. (Ger.) Berg, P. A. (Univ. Med. Clin., Tubingen, Germany). *Klin. Wochenschr.* 49(11):663-664, 1971.

7509 THE TECHNIQUE AND CRITERIA OF ULTRASONIC SCANNING OF SECTORS OF THE LIVER. (Ger.) Rettenmaier, G. (Univ. Med. Clin., Erlangen, Germany). *Electromedica* 39(3):87-91, 1971.

7510 THE CHARACTERISTICS AND PECULIARITIES OF INFUSION CHOLANGIOCHOLECYSTOGRAPHY IN PATIENTS WITH JAUNDICE. (Bul.) Kirov, I., P. Pomakov and A. Haitov. *Suvr. Med.* 22(3):28-31, 1971.

7511 BLOOD BIOCHEMISTRY IN PATIENTS SUFFERING FROM PEPTIC ULCER WITH PARODONTOPATHY. (Rus.) Rudneva, V. E. and S. A. Mescheriakova. *Stomatologiia (Mosk.)* 50(3):11-13, 1971.

7512 DETECTION OF AUSTRALIA ANTIGEN BY MEANS OF IMMUNE ADHERENCE HAEMAGGLUTINATION TEST. (E.) Mayumi, M. (Univ. Hosp. Hongo, Tokyo), K. Okochi and K. Nishioka. *Vox. Sang.* 20(2): 178-181, 1971.

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7516 EXOGASTRIC NEURINOMA DEMONSTRATED BY PARIETOGRAPHY. (Ger.) Lovrencic, M. (Dr. M. Stojanovic, Gen. Hosp., Zagreb, Yugoslavia) and Z. Sumanovac. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1):124-126, 1971.

7517 SCANNING OF INFLAMMATORY LESIONS WITH SILVER ISOTOPES. (Ger.) Jahns, E. (Med. Sch., Hanover, Germany) and A. Brase. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1): 38-41, 1971.

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7519 ESOPHAGEAL LABELING WITH SMALL TANTALUM WIRES: EFFECTS ON MOTILITY AND HISTOLOGY. (E.) Dodds, W. J. (Stanford U. Sch. Med., Calif.), E. T. Stewart, L. J. McCarthy and F. F. Zboralske. *Invest. Radiol.* 6(3):191-198, 1971.

7520 SUPINE VIEW OF THE ABDOMEN IN EVALUATING THE SURGICAL ABDOMEN. (E.) Andrews, A. E. (St. Michael Hosp., Texarkana, Ark.). *J. Abdom. Surg.* 13(7):159-161, 1971.

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7524 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPH (E.) Machado, A. L. (Ceara U. Med. Sch., Brazil). *Br. J. Surg.* 58(8):616-624, 1971.

7525 HYPOTONIC DUODENOGRAPHY IN THE DIAGNOSIS OF SUPERIOR MESENTERIC ARTERY SYNDROME. (E.) Colakoglu, S., M. Haberal, S. Karacadag (Hacettepe U., Ankara, Turkey) and H. Telatar. *Am. J. Gastroenterol.* 56(5):453-456, 1971.

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7527 DISPOSABLE CATHETER DUMMY. A NEW DEVICE FOR X-RAY EXAMINATION OF THE UPPER DIGESTIVE TRACT IN INFANTS. (E.) Bergstrom, K. and H. Jorulf. *Aust. Radiol.* 15(1):65-66, 1971.

7528 INDICATIONS, RESULTS AND LIMITATIONS OF VISCERAL ANGIOGRAPHY. (Ger.) Pokieser, H. (Univ. Ist Med. Clin., Vienna), G. Lechner and H. Umek. *Electromedica* 39(3):74-79, 1971.

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7530 AUTOMATED DIFFERENTIAL ISOENZYME ANALYSIS II. THE FRACTIONATION OF SERUM ALKALINE PHOSPHATASES INTO 'LIVER', 'INTESTINAL' AND 'OTHER' COMPONENTS. (E.) Green, S. (Tufts U. Sch. Med., Boston, Mass.), C. L. Anstiss and W. H. Fishman. *Enzymologia* 41(1): 9-26, 1971.

7531 SERUM CHOLESTEROL AND TRIGLYCERIDES DURING MILD GLUCOSE INTOLERANCE. (E.) Danowski, T. S. (U. Pittsburgh Dept. Med., Pa.), R. C. Khurana and Y. Jung. *Am. J. Clin. Nutr.* 24(7):855-858, 1971.

7532 SENSITIZATION AFTER BSP INJECTION. (Ger.) Fleischhauer, J. (Univ. Psychiatr., Clin., Basel, Germany). *Aerztl. Lab.* 17(9): 343-345, 1971.

7533 EXPERIENCES WITH DIAGNOSTIC PERITONEAL LAVAGE. (Ger.) Stirnemann, H. (Univ. Surg. Clin., Bern, Switzerland). *Helv. Chir. Acta* 38(3):287-290, 1971.

See also numbers: 7327, 7543, 7565, 7593, 7632, 7656, 7673, 7709, 7819, 7820, 7822, 7823, 7824, 7825, 7830, 7834, 7839, 7848, 7857, 7899, 7900, 7908, 7912, 7914, 7934, 7979, 7981, 7991, 8000, 8007, 8040

GASTROINTESTINAL DISEASES

ESOPHAGUS

7534 HIATUS HERNIA, PYLORIC MUSCLE HYPERTROPHY AND CONTRACTED PYLORIC SEGMENT IN ADULTS. (E.) Keet, A. D. (Karl Bremer Hosp., Belville, South Africa) and J. J. Heydenrych. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2): 217-228, 1971.

The association of hiatus hernia with a long, contracted segment in the pyloric area of the stomach was clinically and experimentally investigated and found to occur in 16.5% of 134 patients with hiatus hernia upon barium meal examination. The area involved was 3-5 cm long, extended orally from the pyloric orifice, was smooth-walled with no evidence of mucosal destruction, ulceration or filling defect. While there was some inherent movement, it did not relax completely, and normal "systole" and "diastole" of the area were severely impaired. Delays in gastric emptying, stomach dilatation, gastric ulcer or pernicious anemia were not present in any of the cases. Electrical vagal stimulation in the diaphragmatic hiatus in 6 dogs, just above the gastroesophageal junction, caused similar contractions in the pyloric area and was clearly due to the fibers of the muscularis propria known as the sphincter cylinder of the pyloris, fanshaped muscle or canalis egestorius. The contracted segment was due to hypertrophic pyloric stenosis in some cases and was called pseudohypertrophic pyloric stenosis in those less severe cases with similar anatomic and roentgenographic findings.

7535 BARRETT ESOPHAGUS. THE COLUMNAR-EPITHELIAL-LINED LOWER ESOPHAGUS. (E.) Burgess, J. N. (U. Minnesota Mayo Grad. Sch. Med., Rochester), W. S. Payne, H. A. Andersen, L. H. Weiland and H. C. Carlson. *Mayo Clin. Proc.* 46(11):728-734, 1971.

The records of 17 patients with columnar-epithelial-lined esophagus (Barrett esophagus) as diagnosed by radiographic examination, esophagoscopy with biopsy, esophageal manometry and mucosal electrical potential are reviewed. Twelve of these patients had radiographic findings highly characteristic of Barrett esophagus; that is, esophageal hiatal hernia with a widely dilated esophagogastric junction and a stricture some distance above this. The most characteristic finding in esophageal motility studies in 12 subjects was an elongated zone of increased pressure in the region of the inferior esophageal sphincter when the patient was at rest. In 9 patients a definitive change in potential difference across the esophageal mucosa occurred 2-6 cm above the point of respiratory reversal, and indicated that the change from columnar to squamous epithelium existed at a point well above the muscular esophagogastric junction and the herniated gastric pouch. Fourteen of the 17 patients had esophagitis with linear ulceration and reddening of the squamous mucosa just above the mucosal junctional zone. Nine of these 14 patients had a concomitant esophageal stricture at the squamocolumnar junction. In every case, upon biopsy, columnar epithelium could be easily identified distally and squamous epithelium proximally. In 10 cases parietal cells were identified in the glands of the columnar epithelium which resembled fundal-type gastric epithelium. In 7 cases with no parietal cells the microscopic picture was that of an antral-type epithelium, and in all cases an abundance of goblet-type mucus-producing cells were present both on the surface epithelium and in the walls and depths of the glands. Radiographic study and esophageal manometry may suggest the presence of a Barrett esophagus but endoscopic biopsy is necessary to substantiate the diagnosis.

7536 ESOPHAGEAL MONILIASIS. (E.) Gonzalez, G. (U. Kansas Med. Ctr., Kansas City). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):233-236, 1971.

The fluoroscopic and roentgenographic manifestations in 2 patients with esophageal moniliasis are reported. In the early phase of infection, only the superficial layers of the esophageal wall are involved, and radiologic changes are absent or are characterized by irregularities of the mucosa and slight alteration of the esophageal motility fluoroscopically. When the disease process extends into the deeper layers of the esophageal wall, the esophageal mucosa appears irregular and shaggy on X-ray. Fluoroscopically the transit of barium through the esophagus is slowed by limited distensibility and motility. If the contrast material penetrates under the pseudomembranes which are formed, the esophagus may have a double contour appearance. These patients were successfully treated with amphotericin B alone in 1 case and with mycostatin in the other.

7537 CHALASIA, PEPTIC ESOPHAGITIS, AND HIATAL HERNIA. A COMMON SYNDROME IN PATIENTS WITH CENTRAL NERVOUS SYSTEM DISEASE. (E.) Holmes, T. W., Jr. (U. California Dept. Surg., San Francisco). *Chest* 60(5):441-445, 1971.

A series of 103 consecutive patients with spastic neuromuscular disease producing a chalasia of the cardiac sphincter mechanism and who were treated surgically over a period of 11 yr were reported. Prominent symptoms in all patients were regurgitation and dysphagia of increasing severity. All patients demonstrated cardioesophageal reflux and 95 had an associated sliding or fixed hiatal hernia. Esophagitis with bleeding and frequent stricture formation were observed. Rare associated gastrointestinal lesions included: prior peptic ulcer, Meckel's diverticulum, annular pancreas and appendiceal carcinoid.

Best surgical results were obtained by vagotomy, pyloroplasty, and restoration of the angle of Hiss by gastroplexy. Associated hiatal hernias were repaired by a transabdominal technique, to the left of the esophagus, most strictures then remaining functionally patent. Of 92 survivors of surgery, 84 were improved significantly. Four of the 16 patients with esophageal stricture were among the operative deaths. An important feature of care of these patients was the maintenance of an upright position at meal times and in the immediate postprandial period, also the basic essential of treatment in achalasia of the newborn.

7538 CILIATED EPITHELIAL ESOPHAGEAL CYST. (E.) Vithespongse, P. (U. Maryland Hosp., Baltimore) and S. Blank. *Am. J. Gastroenterol.* 56(5):436-440, 1971.

A case of a 35 yr-old female with an asymptomatic ciliated epithelial esophageal cyst in the right hilar region is presented. A right thoracotomy was performed and the mass was found posterior to the right upper lobe, densely adherent to the esophagus. The mass was round, 4 cm in diameter and contained greyish, viscid fluid. Microscopically, the mass consisted of a thick wall made up of two muscle layers and covered along one surface by a thin uniform layer of ciliated cuboidal cells and columnar cells and was diagnosed as nonmalignant. Management of this congenital anomaly and theories of development are discussed. Roentgenographic diagnosis is the most dependable method and esophageal cysts should be considered in the diagnosis of smooth, round, posterior mediastinal tumors. Surgical excision or enucleation is the treatment of choice.

7539 FATE OF HYPOPLASTIC LUNGS AFTER REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA. (E.) Chatrath, R. R. (Alder Hey Child. Hosp., Liverpool, England), M. El Shafie and R. S. Jones. *Arch. Dis. Child.* 46(249):633-635, 1971.

Ventilatory function was assessed in 14 children between 6 and 12 yr of age who had been operated upon in infancy for correction of congenital diaphragmatic hernias. Chest X-rays were normal in 8 cases, revealed left lung emphysema in 3 and disclosed some elevation of the diaphragm in the remaining 2. Forced expiratory volume and ventilatory capacity were below normal in these children; however, values for functional residual capacity, residual volume, and total lung capacity were normal. In 5 cases the left lung was markedly hypoplastic at operation; forced expiratory volume and ventilatory capacity were decreased in all of these patients. Apparently the hypoplastic lung had not grown normally, despite having expanded to fill the pleural cavity.

7540 ESOPHAGEAL INTRAMURAL DIVERTICULOSIS: A RE-EVALUATION. (E.) Smulewicz, J. J. (Long Island Jewish Hosp., Jamaica, N. Y.) and J. Dorfman. *Radiology* 101(3):527-529, 1971.

One yr prior to the presently reported admission, this woman, then 65 yr old, was discharged on antituberculosis medicine with a presumptive diagnosis of esophageal intramural diverticulosis. Three yr prior to that admission she had undergone esophageal dilatation for a small web, which provided 6 months of relief. At this hospitalization, esophagography revealed multiple outpouchings throughout the entire length of the esophagus. Compared with studies done 1 yr earlier, these differed with respect to size, shape and distribution. The roengentologic mucosal pattern and esophagoscopy suggested an inflammatory process. Cultures and mucosal changes confirmed the diagnosis of esophageal moniliasis. A striking and rapid improvement in the appearance of the lesion and the disappearance of dysphagia followed p.o. therapy with mycostatin.

7541 PATHOPHYSIOLOGY AND MANAGEMENT OF ACUTE CORROSIVE BURNS OF THE ESOPHAGUS: RESULTS OF TREATMENT IN 285 CHILDREN. (E.) Haller, J. A., Jr. (Johns Hopkins U. Sch. Med., Baltimore), H. G. Andrews, J. J. White, M. A. Tamer and W. W. Cleveland. *J. Pediatr. Surg.* 6(5):578-585, 1971.

The effectiveness of the treatment of 285 children with possible acute corrosive burns of the esophagus was evaluated. Of the 235 (82%) who had immediate esophagoscopy, esophageal burns were demonstrable in 69 (29%) and these children were treated with steroids and antibiotics. Strictures developed in 8 patients (12%) with proven esophageal burns and all were successfully treated by prolonged dilatations. All of the 69 patients with proven burns remained free of swallowing symptoms. Whereas immediate antibiotic-steroid therapy does not completely eliminate esophageal stricture formation after burns, it seems to greatly decrease the incidence, or prevent severe scarring which would require replacement of the esophagus rather than dilatation as treatment.

7542 GASTRIC DIVISION: A SURGICAL ADJUNCT IN SELECTED PROBLEMS WITH ESOPHAGEAL ANOMALIES. (E.) Randolph, J. G. (George Washington U. Sch. Med., Washington, D. C.), W. P. Tunell, J. R. Lilly and R. P. Altman. *J. Pediatr. Surg.* 6(5):657-663, 1971.

The use of gastric division as a surgical adjunct in the treatment of 7 infants with specific anomalies relating to esophageal continuity was investigated. Gastric division was performed in 3 patients for staging the repair of esophageal atresia and tracheoesophageal fistula, in 2 patients with esophageal atresia and tracheoesophageal fistula following dehiscence of the primary esophageal anastomosis, in 1 patient with esophageal dysfunction with regurgitation and life-threatening aspiration, and in 1 patient with tracheal agenesis. This procedure, which transects the stomach in its upper third, avoids a transthoracic procedure in the desperately ill child and maintains an unmolested mediastinum for future esophageal reconstruction. Although i.v. hyperalimentation has proved life-saving to many babies, feeding through the gut may be preferable for the long-term maintenance of nutrition if the gastrointestinal tract is available. Thus, gastric division seems preferable to gastrotomy and retropleural fistula division in these esophageal anomalies.

7543 ENDOSCOPIC DIAGNOSIS OF ESOPHAGEAL VARICES. (E.) Dagradi, A. E. (Long Beach VA Hosp., Calif.), D. H. Rodiles, E. Copper and S. J. Stempien. *Am. J. Gastroenterol.* 56(4): 371-377, 1971.

The reliability of esophagoscopic examination in the diagnosis of esophageal varices was determined in 62 successive patients undergoing elective esophagoscopic study. Esophageal varices were visualized and confirmed in 50 of the 62 patients. An observer variation of only 1 cm was noted in 80% of the cases and of only 2 cm in 93% of the cases in establishing the location of the esophagogastric mucosal junction. Large caliber varices (4+ and 4+-5+) were noted in 31 patients by both the staff physician and resident. Minor disagreement occurred in 8 instances. Varices diagnosed in 5 cases as 4+-5+ by the staff physician were diagnosed as 4+ by the resident who had a shorter period of endoscopic experience, while in 3 cases the resident diagnosed 4+-5+ varices which were estimated to be 4+ by the staff physician. Exact agreement in the estimation of the longitudinal extent of the largest caliber of varices visualized occurred in 15 (45%) of cases and in 28 (84%) the longitudinal extent was agreed upon within a distance of ± 2 cm. Observer agreement in estimating the longitudinal extent of the more proximal lower grade (3+) varices in the 31 patients that demonstrated 4+ and 5+ varices distally in the esophagus was 26% (9 cases) and 84% of agreement within a distance of ± 2 cm in 26 cases. The method seemingly provides an accurate estimate of the diameter and extent of esophageal varices and may permit insight into the natural history of portal hypertension as it affects the caliber and extent of esophageal varices.

7544 BASIS OF ANTICOAGULANT AND FIBRINOLYSIN TREATMENT IN THE ACUTE STAGE OF CHEMICAL BURNS OF THE ESOPHAGUS. (Rus.) Feigin, G. A. *Vestn. Otorinolaringol.* 33(4):71-75, 1971.

7545 RECURRENT GASTROINTESTINAL BLEEDING WITH HIATUS HERNIA. (E.) Goldfinger, S. E. (Massachusetts Gen. Hosp., Boston) and B. Castleman. *N. Engl. J. Med.* 285(2):103-113, 1971.

7546 IDIOPATHIC MUSCULAR HYPERTROPHY OF THE LOWER ESOPHAGUS AND PYLORUS IN AN ADULT. (E.) Peison, B. (Mercy Hosp., Chicago, Ill.). *Chest* 59(6):682-687, 1971.

7547 ALLOTRANSPLANTATION OF THE ESOPHAGUS. (Rus.) Raynov, R. *Eksp. Khir. Anestesiol.* 16(3):11-15, 1971.

7548 CARDIOSTOMY FOR MALIGNANT TRACHEO-ESOPHAGEAL FISTULA. (E.) Akiyama, H. (U. Tokyo Sch. Med.) and Y. Sato. *J. Abdom. Surg.* 13(7):144-150, 1971.

7549 TECHNICAL POINTS AND EXPERIMENTAL VALUE OF FUNDOPLICATION (NISSEN'S OPERATION) AS A TREATMENT OF GASTRO-ESOPHAGEAL REFLUX. (Fr.) Jacquemet, L. R. (Sabourin Hosp., Clermont Ferrand, France), G. Glanddier, J. J. Devif and H. Levadoux. *Lyon Chir.* 67(3):235-237, 1971.

7550 SURGICAL MANAGEMENT OF MEGAESOPHAGUS DUE TO CARDIOSPASM: FOLLOW-UP RESULTS IN 74 OPERATED CASES. (It.) Billia, P. (U. Turin Inst. Surg. Anat., Italy) and F. Boltri. *Minerva Chir.* 26(5):223-231, 1971.

7551 ASYMPTOMATIC RIGHT LOWER THORACIC MASS. (E.) Geller, P. (Peninsula Hosp., San Pedro, Calif.) and H. W. Fogle. *Chest* 60(2): 183-184, 1971.

7552 THE ESOPHAGUS IN DIABETES MELLITUS: CINEFLUOROGRAPHIC AND MANOMETRIC OBSERVATIONS. (E.) Langille, D. (Dalhousie U. Dept. Radiol., Halifax, Nova Scotia, Canada), B. S. J. Brown and J. J. Sidorov. *J. Can. Assoc. Radiol.* 22(2):124-129, 1971.

7553 DIAGNOSIS OF EARLY ESOPHAGEAL CANCER. (E.) Endo, M. (Tokyo Women's Med. Coll.), S. Kobayashi and H. Suzuki. *Endoscopy (Stuttg.)* 3(2):61-66, 1971.

7554 SPONTANEOUS RUPTURE OF THE ESOPHAGUS. (Fr.) Benoit, Y. (Hotel Dieu, Sorel, Canada), A. Poissant and M. Vigneault. *Union Med. Can.* 100(5):946-950, 1971.

7555 SPONTANEOUS RUPTURE OF THE ESOPHAGUS. (Fr.) Lallemant, Y. (Beaujon Hosp., Clichy, France). *Cah. Med.* 12(10):851-857, 1971.

7556 RECURRENT HIATAL HERNIA IN CHILDHOOD. (Ger.) Von Der Oelsnitz, G. (City Hosp., Bremen, Germany) and F. Rehbein. *Chir. Praxis* 15(2):233-244, 1971.

7557 REFLUX AND HERNIA. (E.) Anonymous *Br. Med. J.* 3(5768):205-206, 1971.

7558 PROBLEMS OF RETROSTERNAL ESOPHAGOPLASTY WITH RIGHT ILEOCOLON IN A CASE OF GASTRIC RESECTION AFTER INGESTION OF NITRIC ACID. (Rum.) Petrescu, C. (Municipal Emergency Hosp., Bucharest, Rumania), E. Cerchez and A. Poenaru. *Chirurgia (Bucur.)* 20(6):503-510, 1971.

7559 HIATAL HERNIAS WITH MASSIVE ALIMENTARY TRACT HEMORRHAGES. (Rum.) Iliescu, G. (Alex. Sahia Hosp., Bucharest, Rumania) and G. Popa. *Chirurgia (Bucur.)* 20(5):459-463, 1971.

7560 FUNCTIONAL ADAPTATION OF PATIENTS OPERATED ON FOR CANCER OF THE OESOPHAGUS. (Rum.) Gavriliu, D. (C. Davila Hosp., Bucharest, Rumania), E. Albu and A. Grigorescu. *Chirurgia (Bucur.)* 20(6):481-490, 1971.

7561 SPONTANEOUS RUPTURE OF THE ESOPHAGUS: BOERHAAVE'S SYNDROME. (E.) Bolooki, H. (U. Miami Sch. Med., Fla.), I. Anderson, C. Garcia Rivera and J. R. Jude. *Ann. Surg.* 174(2): 319-324, 1971.

7562 TUBERCULOSIS OF THE ESOPHAGUS. (Fr.) Tessier, J. P. and P. Grelet. *Bordeaux Med.* 4(4):1165-1170, 1971.

7563 TUBERCULOUS STRICTURE OF THE ESOPHAGUS: REPORT OF A PATIENT SUCCESSFULLY TREATED BY COLON INTERPOSITION. (E.) Montes, I. (Case West. Reserve U. Div. Thorac. Surg., Cleveland, Ohio), E. Larsen, O. Haiderer and J. H. Kennedy. *Chest* 60(2):194-195, 1971.

7564 PALLIATIVE TREATMENT OF CANCER OF THE ESOPHAGUS: FURTHER EXPERIENCES WITH DOUBLE BARREL TUBING. (Ger.) Stirnemann, H. (Univ. Surg. Clin., Bern, Switzerland) and B. Kammer. *Chirurg* 42(3):130-133, 1971.

7565 RADIOLOGICAL ASPECTS OF HIATUS HERNIA. A SURVEY. (Sw.) Sundgren, R. (Cent. Hosp., Kristianstad, Sweden). *Nord. Med.* 85(20): 613-617, 1971.

7566 THE SURGICAL INDICATION IN HERNIA OF THE ESOPHAGEAL HIATUS AND IN INSUFFICIENCY OF THE CARDIA. (Ger.) Rossetti, M. (U. Basel Dept. Surg., Switzerland). *Z. Allgemein Med.* 47(18):940-941, 1971.

7567 PERFORATION OF THE UPPER ESOPHAGUS. AN UNUSUAL COMPLICATION OF ENDOTRACHEAL INTUBATION. (Fr.) Irrmann Rapp, C. (CHU Dept. Anesthesiol., Strasbourg, France), G. Morand, J. P. Witz and J. P. Gauthier Lafaye. *Anesthesiol. Analg. Reanim.* 28(2):371-375, 1971.

7568 INTRALUMINAL MANOMETRY IN THE STUDY OF ESOPHAGEAL DISEASE. (Sp.) Benages Martinez, A. (Sch. Med. Valencia, Spain), R. Garcia Civera and M. Tomas Ridocci. *Med. Esp.* 65(384):170-181, 1971.

7569 METHODS OF RADIOTHERAPY OF ESOPHAGEAL CARCINOMA WITH MEGAVOLTAGE RADIATION. (Ger.) Alth, G. (U. Vienna Radiol. Clin.). *Radiol. Clin. Biol.* 40(4):243-253, 1971.

7570 REPORT OF A CASE OF REGIONAL INTERSTITIAL ESOPHAGITIS SIMULATING CROHN'S DISEASE. (Fr.) Jacquemet, L. R. (Sabourin Hosp., Clermont Ferrand, France), G. Glanddier and G. Coquelet. *Lyon Chir.* 67(3):214-216, 1971.

7571 UNUSUAL METHOD OF PLASTIC REPAIR OF THE THORACIC ESOPHAGUS. (Cz.) Kuntzen, H. (Friedrich Schiller U. Surg. Clin., Jena, Germany). *Cas. Lek. Cesk.* 110(28-29):665-667, 1971.

7572 A LARGE PHARYNGEAL DIVERTICULUM. (E.) Morris, T. M. O. (Cambridge Milit. Hosp., Aldershot, England) and P. J. M. Wright. *Br. J. Surg.* 58(7):548-550, 1971.

7573 AIR COLLECTIONS IN THE CERVICAL SEGMENT OF THE ESOPHAGUS VISIBLE ON LATERAL FILMS OF THE CERVICAL SPINE AS A ROENTGENOLOGIC SIGN OF DYSPHAGIA. (Ger.) Reinhardt, K. (Dist. Hosp., Volklingen/Saar, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1):118-119, 1971.

7574 RECONSTRUCTION OF SUBCUTANEOUS ARTIFICIAL ESOPHAGUS INTO RETROSTERNAL FORM. (Rus.) Petrov, B. A. and A. P. Sitnik. *Khirurgiia (Mosk.)* 47(7):131-135, 1971.

7575 RELIEF OF STRICTURE IN THE CERVICAL ESOPHAGUS BY Z PLASTY TECHNIQUE. (E.) Gross, C. W. (U. Tennessee Med. Sch., Memphis) and A. S. Harris. *Laryngoscope* 81(5):658-662, 1971.

7576 TREATMENT OF BLEEDING ESOPHAGEAL VARICES. (E.) Anonymous. *Lancet* 1(7711):1225-1226, 1971.

See also numbers: 7469, 7513, 7519, 7638

7577 LATE FOLLOW-UP STUDIES AFTER OPERATION FOR CONGENITAL PYLORIC STENOSIS. (E.)

Wanscher, B. (Community Hosp., Copenhagen) and H.-E. Jensen. *Scand. J. Gastroenterol.* 6(7): 597-599, 1971.

A follow-up of 14 congenital pyloric stenosis patients treated with Fredet-Ramstedt pylorotomy revealed that 8 had slight periodic symptoms: epigastric burning sensation, and acid regurgitation occasionally relieved by food. Two had marked symptoms of the same nature. Barium meal studies in 12 patients showed no abnormality of the pylorus or duodenal bulb; retention was seen in 2 patients who showed no symptoms. Eight patients had fasting gastric aspirates more than 100 ml; 3 had food remnants in the aspirate, despite 8 hr fasting. Following pentapeptide stimulation, volume secretion was about 40% higher than in normal individuals, but peak acid output was within normal limits. None of the patients had symptoms of dumping.

7578 THE EFFECT OF SOME ANTITUBERCULOUS DRUGS UPON THE UPPER GASTROINTESTINAL TRACT: AN EXPERIMENT WITH PARA-AMINOSALICYLIC ACID, ISONIAZID, AND STREPTOMYCIN. (E.)

Varis, K. (Univ. Cent. Hosp., Helsinki), R. Koskinen, J. Jussila, T. Rytömaa, S. Tarpila and K. Launiala. *Scand. J. Gastroenterol.* 6(7):589-595, 1971.

During treatment with antituberculous drugs 2 of 6 patients had inflammatory cell reactions similar to chronic superficial gastritis. In all cases eosinophils in the gastric mucosa increased after 2 weeks of treatment and returned to normal levels after 12 weeks in 4 patients. Eosinophils also increased in the intestinal mucosa but not as markedly. Disaccharidase activity, but not protein content, of the small intestinal mucosa decreased during the first 2 weeks of treatment. Absorption of fats and para-aminosalicylic acid were essentially normal, while SGOT levels rose in all patients to the normal upper limit. Subjective gastrointestinal symptoms showed no correlation with objective findings of the state of the upper digestive system. The nature of possible liver damage in the present patients may be toxic rather than allergic.

7579 ACUTE HAEMORRHAGIC GASTRITIS: MODERN CONCEPTS BASED ON PATHOGENESIS. (E.)

Ivey, K. J. (Roy. Prince Alfred Hosp., Camperdown, Australia). *Gut* 12(9):750-757, 1971.

The pathogenesis and management of acute hemorrhagic gastritis, a condition of acute diffuse superficial erosions or multiple petechial hemorrhages of the gastric mucosa, which is usually confined to, or predominant in, the fundal region, is reviewed. Twenty-five percent of all cases of gastrointestinal bleeding are due to acute hemorrhagic gastritis, and in these patients, massive bleeding results in more than 50% mortali Salicylates and acute hemorrhagic shock in the presence of adequate concentrations of acid can both produce an acute hemorrhagic gastritis, and in both cases there is an increased back diffusi of hydrogen ions across the gastric mucosa. Neutralization of the gastric contents should be accomplished as early as possible with a continu intragastric infusion of a sodium bicarbonate solution (e.g. 1 mEq/ml at the rate of 1,000 mEq/24 hr) as this prevents the development of bleeding and erosions. Vagotomy (and pyloroplasty) may be effective in less severe cases by reducing acid secretion and mucosal blood flow b complete gastrectomy may be necessary.

7580 RADIOGRAPHIC DEMONSTRATION OF GASTRIC VARICEAL BLEEDING. (E.)

Hourigan, K. J. (Roy. Free Hosp., London). *Gut* 12(10): 822-824, 1971.

Emergency percutaneous splenoportography was used to demonstrate an actively bleeding gastri varix in a 65 yr-old woman known to have primar biliary cirrhosis with portal hypertension and esophagogastric varices. During the 4 days following her admission, standard medical proce failed to control the bleeding and a total of 2 units of whole blood was given. Radiologically the striking feature was a blush in the region of the gastric fundus just seen at two seconds, interpreted as extravasation from a short gastr collateral. In subsequent films the blush enlarged and became rounded, finally "targeting" with central fading, remaining as a distinct density after all i.v. contrast had cleared. An emergency end-to-side portacaval shunt was performed but bleeding from the upper gastrointestinal tract continued and was complicated by progressive oliguric renal failure. The patient died on the thirteenth postoperative da

7581 ASPIRIN AND ALCOHOL IN GASTROINTESTIN HAEMORRHAGE. (E.)

Needham, C. D. (Roy. Infirm., Aberdeen, Scotland), J. Kyle, P. F. Jones, S. J. Johnston and D. F. Kerridge. *Gut* 12(10):819-821, 1971.

The role of aspirin, alcohol and a combination of both in the causation of gastrointestinal hemorrhage was studied in 817 patients admitted for gastrointestinal bleeding and 300 controls. Of the 817 patients, 17% of the men and 6.5% of the women had taken alcohol before admission, while 24% and 3%, resp., of the controls had done so. Twenty-six percent of the men and 24 of the women in the patient group had taken aspirin, as compared with 9% and 12%, resp., i one control group, and 6% and 14%, resp., in th other. The association between bleeding and aspirin was highly significant in patients wit duodenal ulcer, gastric ulcer and gastritis. A synergistic effect was observed between aspirin and alcohol in those patients who had consumed both, the duodenal ulcer group showing the highest level of significance. In the non-peptic group, however, there is no suggestion of any effect.

7582 EPIDEMIOLOGICAL APPROACHES TO THE AETIOLOGY OF CHRONIC ATROPHIC GASTRITIS. (E.) Berndt, H. (Inst. Cancer Res., Berlin). *Digestion* 4(4):2502-54, 1971.

A review of the literature (17 references).

7583 GASTRIC SECRETION OF CALCIUM AND INORGANIC PHOSPHORUS IN PATIENTS WITH PRIMARY HYPERPARATHYROIDISM. (E.) Christiansen, J. (Solbakken 20, Virum, Denmark) and P. Aagaard. *Scand. J. Gastroenterol.* 6(6):569-572, 1971.

Ten patients with primary hyperparathyroidism ithout gastric or duodenal ulcers and 20 control atients were studied. Basal gastric calcium oncentration as well as output was higher in atients with hyperparathyroidism, especially ver the first 15 min. By contrast, histamine-timulated secretion values were the same in both roups; concentration fell and output remained nchanged. No difference between the 2 groups ould be demonstrated in basal or in stimulated ecretion of phosphate. Gastric concentration, ut not output, seems to rise with increasing erum calcium. No conclusions as to the signifiance of the increased basal gastric calcium ecretion in ulcerogenesis could be made.

584 EFFECTS OF HISTAMINE ACID PHOSPHATE AND PENTAGASTRIN ON GASTRIC SECRETION IN ORMAL HUMAN SUBJECTS AND IN PATIENTS WITH VARIOUS ASTRODUODENAL DISEASES. (E.) Aubrey, D. A. Welsh Natl. Sch. Med., Cardiff) and A. P. M. orrest. *Ann. Surg.* 174(5):866-879, 1971.

ormal controls (10) and patients with gastrouodenal diseases (12 with duodenal ulcer, 6 with astric ulcer, 4 with atrophic gastritis and 5 ith pernicious anemia) received increasing serial v. doses of 0.15-12.0 μg/kg/hr of pentagastrin r 1.0-80.0 μg/kg/hr of histamine acid phosphate. astric acid secretion was similar with both gents while maximal outputs of pepsin were reater with histamine. Maximal secretion of oth acid and pepsin was seen with 40 μg/kg/hr of istamine and 6.0 μg/kg/hr of pentagastrin. In ach group of patients, the electrolyte concenrations in the gastric juice did not vary with he 2 agents. Electrolyte interrelationships ere normal in controls and patients with duodenal lcer, but not in the other patients. While the elationships between the concentrations of H^+ nd Na^+ were the same in patients with atrophic astritis and gastric ulcer, in both groups here were higher than normal concentrations of Na^+ in the gastric juice at low acidity. With an increasing rate of gastric secretion, the gastric juice contained relatively less of the nonparietal component, but, at comparable H^+ concentrations, the mean percentage volumes of the nonparietal component in the gastric juice were not significantly different in the various groups.

7585 IMMUNOHISTOLOGICAL STUDIES ON GASTRIC MUCOSAL GLYCOPROTEIN IN GASTRIC CARCINOMA. (E.) Kawasaki, H. (Kurume U. Sch. Med., Japan), K. Imasato and E. Kimoto. *Gann* 62(3):171-176, 1971.

Mucosal glycoprotein was isolated from normal human gastric mucosa obtained at autopsy. Rabbits were immunized with this glycoprotein, and the γ-globulin isolated from the pooled antisera was conjugated to fluorescein isothiocyanate. This conjugated substance was then used for the immunofluorescence staining of gastric carcinomas. There was intense fluorescence with carcinoma cells of carcinoma simplex which showed irregularly dissociated patterns within the mucosa and those which infiltrated diffusely into the submucosal and muscular layers. The fluorescence correlated well with spots staining with periodic acid-Schiff rather than with Alcian Blue. There was very little fluorescence in the case of adenocarcinomas with well differentiated glandular structures within the mucosa of tubular and papillary form and containing little cytoplasmic mucus, even in the cases of mucocellular or muconodular patterns. There was faint fluorescence in the sites of marked metaplasia and abundant staining with Alcian Blue. Less differentiated adenocarcinoma cells within the submucosal and muscular layers fluoresced well.

7586 GASTRIC SECRETORY AND SEROLOGIC STUDIES ON PATIENTS WITH NEOPLASTIC AND IMMUNOLOGIC DISORDERS. (E.) Twomey, J. J. (VA Hosp., Houston, Tex.), A. H. Laughter, N. D. Villanueva, Y. S. Kao, M. D. Lidsky and P. H. Jordan, Jr. *Arch. Intern. Med.* 128(5):746-749, 1971.

Twenty-one patients with multiple myeloma, 10 with rheumatoid arthritis, and 10 with other lymphoproliferative disorders (leukemia, Hodgkin's disease, lymphosarcoma) were given 2-hr gastric acid and intrinsic factor secretory capacity tests. Total volume, HCl and intrinsic factor content in gastric aspirates from each group of patients was reduced, being least reduced in rheumatoid arthritis. A 52-yr-old man with multiple myeloma had betazole fast achlorhydria with minimal intrinsic factor secretion and histologic evidence of atrophic gastritis. A 48-yr-old man with chronic lymphocytic leukemia and a 50-yr-old man with lymphocytic lymphosarcoma also showed impaired gastric secretory studies and Schilling tests. Parietal cell, intrinsic factor-vitamin B_{12} blocking, and anti-nuclear antibodies were not detected in serum from any of the patients. None of the patients had reduced serum levels of vitamin B_{12}. Four patients with multiple myeloma gave family histories pertinent to the diagnosis of pernicious anemia. Intrinsic factor secretion declines with prolonged survival in multiple myeloma. In contrast, there seems to be a close relationship between the onset of idiopathic delayed onset IgG deficiency and coexistent pernicious anemia.

7587 VOLVULUS OF THE STOMACH. A REVIEW WITH A REPORT OF 8 CASES. (E.) Wastell, C. (Westminster Hosp., London) and H. Ellis. *Br. J. Surg.* 58(8):557-562, 1971.

All of the cases were examples of the organo-axial, chronic anterior type. Classification of gastric volvulus was broken down into type, extent, direction, etiology and severity and was based on 206 patients reported in various papers and the present 8 cases. Organo-axial volvulus occurs around a line from the pylorus to the esophagogastric junction and was present in 59% of all cases, while the rest were mostly of the mesenterio-axial type, which occurs around the axis running from the center of the greater curvature of the stomach to the porta hepatis. With both types of volvulus the extent of involvement of the stomach was invariably total, and partial involvement was usually observed only in acute cases. Anterior rotation of either the transverse colon (organo-axial) or pylorus (mesenterio-axial) was by far the more common direction of each volvulus as was expected on anatomical grounds. Seventy-four and 63% of the cases of organo-axial and mesenterio-axial volvulus, resp., were secondary to or occurred in the presence of intra-abdominal disease, such as congenital or acquired herniation of the stomach through the diaphragm. One-third of the cases were idiopathic in that they were not associated with any abnormality or disease of the abdomen. Over 60% of the 2 types of volvulus were of the acute type presenting an abdominal emergency with either strangulation or obstruction of the stomach as opposed to the symptom-free chronic type. Poor prognosis was associated with acute volvulus by the fact that 20 of 36 patients (56%) and 31 of 73 patients (42%) died with acute mesenterio-axial and organo-axial volvulus, resp.; whereas, only slightly over 10% of the patients with chronic volvulus of either type died. The peak incidence of cases for men and women was in the fifth decade and was equal in incidence for both sexes. Gastric volvulus is rare and can exist without symptoms, but acute gastric volvulus, occurring in a patient who has had acute symptoms, requires immediate surgical treatment.

7588 ACUTE VOLVULUS OF THE STOMACH IN INFANTS AND CHILDREN. (E.) Cole, B. C. (Naval Hosp, St. Albans, N. Y.) and S. J. Dickinson. *Surgery* 70(5):707-717, 1971.

Two cases of infantile acute gastric volvulus in infants (newborn and 5 months old) are reported and the literature is reviewed (58 references). The authors recommend a classification based on a modification of Singleton's classification: type as either mesenterioaxial or organoaxial; direction as anterior or posterior; etiology as idiopathic or secondary to disease or abnormality in the stomach or adjacent organs or in their fixation. Diaphragmatic abnormalities were involved in both these cases as well as in a majority of those in the literature. The chief symptom of gastric volvulus was vomiting or retching, whicy may or may not be productive. The other components of the triad of Borchardt (acute localized distention of the stomach and difficulty or impossibility of passage of a nasogastric tube) may be difficult to evaluate in this age group. Early surgical intervention is recommended and should include fixation of the stomach after reduction of the volvulus. In infants this is easily accomplished by gastrostomy which also serves as a means of postoperative gastrointestinal decompression.

7589 ULCER LIKE CANCER OF THE ANTERIOR PART OF THE GREATER CURVATURE OF THE STOMACH. (Fr.) Henrion, C. *J. Belge Radiol.* 54(3): 413-414, 1971.

7590 INDUCTION OF CARCINOMA OF GLANDULAR STOMACH IN RATS BY LOCAL APPLICATION OF 7,12-DIMETHYLBENZ[a]ANTHRACENE. (E.) Takahashi, T. (Kyoto Prefectural U. Med., Japan), T. Yanagisawa and S. Majima. *Gann* 62(4):259-265, 1971.

7591 GASTRIC PHYTOBEZOAR FOLLOWING GASTRECTO (E.) Sanderson, I. (Women's Coll. Hosp., Toronto, Ontario, Canada), O. Ibberson and E. B. Fish. *Can. Med. Assoc. J.* 104(12): 1115-1119, 1971.

7592 SULPIRIDE IN TREATMENT OF GASTRIC INTOLERANCE TO ANTITUBERCULOSIS ANTIBIOTICS. (Fr.) Estrader, M. F., G. Lalevee and A. Fraisse. *J. Med. Chir. Prat.* 142(15):588-595, 1971.

7593 FIBERGASTROSCOPY IN SUPERFICIAL EPITHELIOMAS OF THE STOMACH (10 CASES). (Fr.) Liguory, C. (St. Antoine Hosp., Paris), M. Huguier and J. Conte Marti. *Chirurgie* 97(2): 138-141, 1971.

7594 TOTAL GASTRECTOMY. AN OPERATION OF NECESSITY IN GASTRIC NEOPLASM. (Rum.) Bancu, E. (1st Surg. Clin., Tirgu Mures, Rumania) D. Radu and M. Herman. *Chirurgia (Bucur.)* 20(5) 403-406, 1971.

7595 A NEW GASTROPLASTY PROCEDURE WITH DOUBLE LOOP. (Rum.) Matei, A. M. (Colentina, Surg. Clin., Bucharest, Rumania). *Chirurgia (Bucur.)* 20(6):527-536, 1971.

7596 GASTRIC INFLAMMATORY TUMOURS (DIAGNOSTIC DIFFICULTIES). (Rum.) Setlacec, D. (Fundeni Clin., Hosp., Bucharest, Rumania), G. Niculiu and B. Marinescu. *Chirurgia (Bucur.)* 20(5):385-394, 1971.

7597 RESULTS OF SURGICAL AND CONSERVATIVE TREATMENT OF GASTRODUODENAL HEMORRHAGES. (Ger.) Roeder, H. U. (Cent. Hosp., Bremen, Germany). *Bruns Beitr. Klin. Chir.* 218(7): 627-632, 1971.

7598 VARIANTS IN THE STRUCTURE OF THE GASTRIC MUCOUS MEMBRANE IN CHRONIC GASTRITIS. (Rus.) Lisochkin, B. G. *Arkh. Patol.* 33(7):(78), 1971.

7599 SUPERFICIAL CARCINOMA OF THE STOMACH. VALUE OF PERORAL GASTRIC BIOPSY UNDER DIRECT VISION. (Fr.) Liguory, C. (Saint Antoine Hosp., Paris), F. Bodin and P. Fouet. *Ann. Med. Interne (Paris)* 122(6-7):743-746, 1971.

7600 VALUE OF THE GASTROCYTOGRAM IN NON-MALIGNANT STOMACH DISEASE. (Ger.) Miczban, I. (Janos State Hosp., Budapest, Hungary). *Diagnostik* 4(3):127-128, 1971.

7601 RANGE OF USEFULNESS OF RADIOGRAPHY OF THE STOMACH UNDER OUTPATIENT CONDITIONS. TECHNIC AND APPRAISAL OF GASTRIC RADIOLOGY. (Ger.) Bopp, J. (Local Hosp., Bielefeld, Germany). *Med. Welt* 22(31-32):1236-1239, 1971.

7602 STUDIES OF THE SECRETORY AND MOTOR FUNCTION OF THE STOMACH IN WORKERS WITH VIBRATING INSTRUMENTS. (Bul.) Yasov, K. and S. Kambourov. *Med. Probl. (Plovdiv)* 23(3-4): 83-88, 1971.

7603 PROBLEMS POSED BY VOLUMINOUS GASTRIC TUMORS. (Fr.) Lataix, P., J. Delage and P. L. Chiapponi. *Rev. Cent. Hosp. Univ. (Paris)* 18:43-46, 1971.

7604 COMBINED X-RAY DIAGNOSIS OF CARCINOMA OF THE STOMACH. VALUE OF PARIETOGRAPHIC, ANGIOGRAPHIC AND PARIETO ANGIOGRAPHIC EXAMINATIONS. (Ger.) Leyda, H. (Humboldt U. Inst. Roentgenol., Berlin), W. Munster, G. A. Kutschinski and B. V. Dobrovolski. *Radiol. Diagn. (Berl.)* 12(1):57-67, 1971.

7605 SURGICAL THERAPY OF GASTRIC CANCER AND ITS LONG TERM RESULTS. (Ger.) Schuster, G. (Northwest Hosp., Frankfurt/M., Germany), W. Hartel and J. Lenz. *Med. Klin.* 66(15):544-547, 1971.

7606 CARCINOMA OF STOMACH 40 YEARS AFTER GASTROENTEROSTOMY. REPORT OF A CASE. (E.) Prots, R. A. (VA Hosp., Des Moines, Iowa) and L. R. Dragstedt, II. *Ohio State Med. J.* 67(6):521-525, 1971.

7607 PRESENT VIEWS ON THE MECHANISM OF GASTROINTESTINAL BLEEDING AFTER INGESTION OF SALICYLATES. (Pol.) Judkiewicz, L. (Inst. Intern. Med., Lodz, Poland) and T. Olszanska. *Pol. Tyg. Lek.* 26(27):1053-1055, 1971.

7608 IATROGENIC STOMACH RUPTURE. (Rum.) Andreoiu, C. (2nd Hosp., Ploiesti, Rumania), O. Mantz and R. Bellu. *Chirurgia (Bucur.)* 20(6):537-540, 1971.

7609 INTRAGASTRIC INVAGINATION OF EFFERENT LOOP IN BILLROTH II GASTRECTOMY. REPORT OF A CASE. (Por.) Ceneviva, R. (U. Sao Paulo Sch. Med., Brazil), J. L. Pimenta Modena and P. L. Castelfranchi. *Rev. Assoc. Med. Bras.* 17(3):77-80, 1971.

7610 PYLORIC STENOSIS IN THE ADULT. (Fr.) Bernades, P. (Beaujon Hosp., Clichy, France). *Rev. Prat. (Paris)* 21(15):2583-2596, 1971.

7611 A NEW METHOD OF PYLOROPLASTY. (E.) Hines, J. R. (Northwestern U. Med. Sch., Chicago, Ill.). *Surg. Gynecol. Obstet.* 133(1):101-102, 1971.

7612 CANCER OF THE CARDIA OR VARICES OF THE FUNDUS? CONTRIBUTION TO DIFFERENTIAL DIAGNOSIS. (Ger.) Theophil, B. (Moabit City Hosp., Berlin). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1):122-124, 1971.

7613 SEVERE GASTRIC HEMORRHAGE FROM MICRO-ULCERATION AND ARTERIAL EROSION. (Fr.) Ladouch, A. (Bicetre Hosp., Kremlin Bicetre, France), P. Monod Broca, G. Lesourd and J. Paillas. *Presse Med.* 79(29):1331-1336, 1971.

7614 X-RAY DIAGNOSIS OF CANCER IN THE GLANDULAR STOMACH OF RATS. (E.) Kurihara, M. (Jutendo U. Dept. Intern. Med., Tokyo), H. Ichikawa, S. Fujimura and T. Sugimura. *Gann* 62(3):225-229, 1971.

See also numbers: 7486, 7487, 7496, 7501, 7534, 7537, 7669, 7796, 7993, 8025

7615 THE PEPTIC GASTRIC ULCER - HISTOTOPOGRAPHIC AND FUNCTIONAL INVESTIGATIONS.

(E.) Stadelmann, O. (U. Bonn Med. Polyclin., Germany), K. Elster, M. Stolte, S. E. Miederer, P. Deyhle, L. Demling and W. Siegenthaler. *Scand. J. Gastroenterol.* 6(7):613-623, 1971.

Endoscopic and biopsy studies of the gastric mucosa were performed in more than 200 patients with chronic gastric ulcers. Chronic gastric ulcer is found in mucosa containing only mucoid or intestinal glands. The matrix of the ulcer was nearly always inflamed. The only exception was the prepyloric ulcer in which mucosal morphology and secretory gastric function closely resembled that of the duodenal ulcer. The localization of the ulcer was an indication of the extent of gastritis, and of the maximal acid secretion capacity of the stomach, since the ulcer was always found at the border of the acid-producing mucosa. Normal body or antrum mucosa was found more rarely in patients with gastric ulcer than in corresponding controls.

7616 THE STABILITY OF THE INSULIN TEST RESULT AFTER TRUNCAL VAGOTOMY AND DRAINAGE FOR DUODENAL ULCER.

(E.) Kronborg, O. (Bispebjerg Hosp., Copenhagen). *Scand. J. Gastroenterol.* 6(7):637-644, 1971.

Insulin test results 10 days after truncal vagotomy and drainage for duodenal ulcer were compared with test results 3-4 yr later in 320 patients. Fasting acid secretion in patients without dyspepsia was higher the tenth day than 3-4 yr later; men but not women with dyspepsia also had a higher secretion on the tenth day. The increase of insulin activated secretion during 3-4 yr after pyloroplasty was small, but significant, in patients without dyspepsia. An increase was also seen in the frequency of positive criteria (mean acidity, mean pH) of the activated secretion. Regeneration of vagal nerves across the gap created at operation may have occurred. Differentiation between patients with and without dyspepsia did not result in differences in secretion, and no clue could be found indicating that the clinical status at the follow-up was more consistent with the late than the early test.

7617 PEPTIC ULCER IN THE BURUNDI REPUBLIC AND NILE-CONGO WATERSHED.

(E.) Hamber, G. (Hosp. de Buye, Burundi) and M. Von Bergen. *Trop. Geogr. Med.* 23(3):213-219, 1971.

At this 76-bed rural hospital in the Nile-Congo watershed, in a period of 32 months there were 404 patients with peptic ulcer disease who came to surgery. Of 349 patients with duodenal ulcer, 53 presented with pyloric stenosis. In the absence of alternative upper gastrointestinal pathology, ulcer disease was diagnosed accurately preoperatively in 92.4% of the patients without the use of radiologic tools. Truncal vagotomy and drainage were performed for duodenal and prepyloric ulcers in 319 cases. Gastric ulcers were treated by partial gastrectomy in 12 cases with 1 postoperative death. Three patients died after vagotomy and 1 died after gastroenterostomy for duodenal ulcer. Of 8 patients with perforate ulcers (6 duodenal and 2 anastomotic) 3 died postoperatively. Most of the procedures were performed under spinal anesthesia.

7618 DEATHS FOLLOWING OPERATION FOR DUODENAL ULCER.

(E.) Kleitsch, W. P. (VA Hosp., Phoenix, Ariz.). *Milit. Med.* 136(11): 842-846, 1971.

The 2565 patients in this Veterans Administratio cooperative study were divided into 2 groups: 1 in which the operation was randomly assigned after the abdomen was opened; a second, not randomized, in which for some reason the surgica procedure was chosen by the surgeon. The procedures chosen for study by randomization were: subtotal gastrectomy; hemigastrectomy and vagoto antrectomy and vagotomy; and vagotomy with a drainage procedure, either pyloroplasty or gastroenterostomy. There were 19 postoperative deaths among 1358 randomized patients (1.4%) and 70 deaths among 1207 nonrandomized patients (5.8%). In the randomized groups, 52.6% of the deaths were in the seventh decade, while in the nonrandomized group, 81.4%. In the randomized group, 57.9% of the postoperative deaths were attributed to sepsis and peritonitis related to the surgery, and the remainder to miscellaneous causes. In the nonrandomized group, 21.4% of the deaths were attributed to sepsis, 20.0% to hemorrhage (78.5% of these in patients undergoi vagotomy and drainage) and the remainder to oth causes.

7619 METABOLIC STUDIES OF DEGLYCYRRHIZINIS LIQUORICE IN TWO PATIENTS WITH GASTRI ULCER.

(E.) Cooke, W. M. (Roy. Postgrad. Med. Sch., London) and J. H. Baron. *Digestion* 4(5): 264-268, 1971.

The metabolic activity of deglycyrrhizinized liquorice (2.28 g/day for 21 days) was studied in 2 female patients with gastric peptic ulcer. In neither patient were there any signs of flui retention, and hemoglobin, packed cell volume, mean corpuscular hemoglobin concentration, whit cell count, platelets, liver function tests, serum cholesterol, blood glucose, chest X-rays and ECG were within normal limits. Body weigh and blood pressure remained unchanged. Althou slight nitrogen retention was observed in both patients, neither showed significant changes i external balance or serum levels of sodium, potassium or chloride. Deglycyrrhizinized liquorice appears to contain an ulcer-healing agent without the aldosterone-like activity of liquorice, glycyrrhizinic acid and carbenoxolone.

7620 PREVENTION OF STRESS ULCERS. (E.) Chernov, M. S., H. W. Hale, Jr. (Maricopa County Gen. Hosp., Phoenix, Ariz) and M. Wood. *Am. J. Surg.* 122(5):674-677, 1971.

Serum vitamin A, which helps maintain the integrity of mucus-secreting cells of the gastrointestinal tract, was measured in 35 severely stressed patients. In 35 patients with either intensive burns, or major injury of 2 or more organ systems, vitamin A levels fell in 29 within 24-72 hr after admission, and 13 had levels below 10 μg%. Massive doses of parenteral vitamin A and high protein diets helped to raise the serum level to normal. Although urine vitamin A levels were negligible, blister fluid levels of vitamin A closely paralleled the patient's serum level. Evidence of stress ulcer was seen in 15 of 22 patients not treated with vitamin A. Serious gastrointestinal bleeding occurred in 14 patients, massive bleeding occurred in 7 cases, and 1 patient had a perforated ulcer. Of 14 patients treated with massive doses of parenteral vitamin A, upper gastrointestinal bleeding occurred in 2; 1 had tarry stools with a falling hematocrit, and in the other, intravascular consumptive coagulopathy developed. High doses of parenteral vitamin A in the severely injured patients reduces the risk of gastroduodenal ulceration.

7621 PEPTIC ULCERATION AND OBSTRUCTIVE DISEASE. RESPIRATORY INSUFFICIENCY. (E.) Asnaes, S. (Bispebjerg Hosp., Copenhagen), A. A. Johansen and B. Söeberg. *Scand. J. Gastroenterol.* 6(7):631-635, 1971.

Gastric acid secretion, gastric mucosa histology, and frequency of gastroduodenal ulceration were studied in 44 patients with severe obstructive respiratory insufficiency. Of 10 patients with an augmented histamine response of less than 10 mEq/hr, 9 had histological gastritis and 2 had peptic ulcers. Of 34 with an augmented response greater than 10 mEq/hr, 28 had histological gastritis, and of these, 10 had peptic ulcers; thus 12 of 44 patients had ulcers. Thirty of the 37 patients with gastritis had atrophic gastritis. No correlation could be demonstrated between the degree or duration of respiratory insufficiency and either incidence of peptic ulceration or degree of atrophic gastritis. More comprehensive studies of total acid production and of multiple gastric biopsies are desirable in patients with respiratory insufficiency.

7622 RADIOGRAPHY IN THE DIAGNOSIS OF RECURRENT DUODENAL ULCERATION FOLLOWING VAGOTOMY AND PYLOROPLASTY. (E.) Fredens, M. (Bispebjerg Hosp., Copenhagen), O. Kronborg, P. Madsen and J. Palböl. *Scand. J. Gastroenterol.* 6(6):559-561, 1971.

Over a period of 6 yr, 39 ulcer patients were reoperated because of clinical symptoms (dyspepsia with or without gastrointestinal bleeding) indicating the presence of a recurrent duodenal ulcer. At reoperation a recurrent ulcer was found in 24 patients. A blind retrospective assessment of the X-ray films revealed that in 12 of 24 patients with recurrent ulcer, the diagnosis was established radiologically. There was no radiological evidence of a crater, nor any signs indicating pyloric stenosis in the other 12 patients. A positive insulin test (Hollander) occurred in 14 of 24 patients with recurrent ulcer and in 5 of 9 patients without ulcers. According to the criteria of Kronborg, positive insulin tests occurred in 23 and 7 patients, resp. Thus radiography had a somewhat lower sensitivity (50%) but a higher specificity (100%).

7623 TRUNCAL VAGOTOMY AND DRAINAGE IN 500 PATIENTS WITH DUODENAL ULCER. (E.) Kronborg, O. (Bispebjerg Hosp., Copenhagen). *Scand. J. Gastroenterol.* 6(6):501-509, 1971.

Truncal vagotomy and drainage was performed in 500 patients with duodenal ulcer and the results were evaluated by means of a follow-up 3-4 yr after the operation. The overall operative mortality was 0.6%, all 3 patients dying of cardiopulmonary disease. Recurrence occurred in 6% (28) of the patients. Dumping occurred in 32% of the patients with no difference between pyloroplasty and gastrojejunostomy. Frequency of daily bowel movements and incidence of diarrhea were significantly higher at the follow-up than before either operation. No significant relations were found between the frequency of diarrhea and insulin test criteria. Serum vitamin B_{12} was low in 32 of 405 patients; however, no significant difference was found in the postoperative augmented histamine response between patients with normal and low serum vitamin B_{12}. At follow-up, 52% of the patients were symptom-free, but a further 40% were fully capable of work in spite of dyspepsia and/or postcibal symptoms.

7624 SELECTIVE VAGOTOMY OF THE GASTRIC REMNANT FOR EXTRAGASTRIC ULCER RECURRENCE FOLLOWING RESECTION. (E.) Amdrup, E. (Municipal Hosp., Copenhagen). *Scand. J. Gastroenterol.* 6(6):489-493, 1971.

Selective vagotomy was performed by the abdominal approach in 20 patients with extragastric ulcer recurrence from 1-16 yr after primary partial gastrectomy. Eight patients with gastrojejunal anastomosis had recurrence localized in the jejunum just distal to the stoma. Of 12 patients with gastroduodenal anastomoses, 11 had recurrence just distal to the anastomosis. One patient died postoperatively from coincident cardiac disease. The postoperative aspirate of spontaneous secretion from the 19 surviving patients was alkaline. Histamine or pentapeptide activation of acid secretion was abolished in 9 patients and reduced by over 80% in the other 10. Pre- and postoperative insulin tests performed in 6 patients revealed that postoperative secretion was abolished, and volume secretion reduced by 50% (peak acid output) and 60% (2 hr.).

7625 METABOLIC CONTRIBUTIONS TO GASTRIC ULCEROGENESIS IN MICE. (E.) Essman, W. B. (Queens Coll., Flushing, N. Y.), S. G. Essman and M. I. Golod. *Physiol. Behav.* 7(4): 509-516, 1971.

Immobilization was followed by an increase in the number and severity of gastric ulcers in mice deprived of food for 24 hr or more, but not in animals deprived of food for less time. Mice with ulcers had 20% more gastric 5-HT than non-ulcerated mice. The pH of the gastric tissue from ulcerated animals was higher than that of non-ulcerated tissue. Gastric 5-HT concentration was lower in the stomachs of animals with gastric pathology with immobilization as compared to food deprivation-induced pathology alone. No differences were observed between ulcerated and non-ulcerated tissue regarding 5-hydroxyindole acetic acid (5-HIAA) or gastric histamine levels. Monoamine oxidase caused a decrease in the levels of both 5-HT and 5-HIAA, these effects being related to immobilization, duration of fasting, and ulcer incidence. Thus, gastric ulcerogenesis in mice seems to be accounted for by physiologically-induced changes in the metabolism of gastric 5-HT.

7626 NERVOUS SYSTEM MANIFESTATIONS AFTER GASTRIC SURGERY. (E.) Banerji, N. K. (Roy. Victoria Hosp., Belfast, Ireland) and L. J. Hurwitz. *Acta Neurol. Scand.* 47(4):485-513, 1971.

A special neurological study of 106 patients who had undergone surgery for benign peptic ulcer revealed that 34 (32%) of the patients indicated nervous system symptoms. Sixteen (15.1%) of these patients had neurological signs with the symptoms. The time interval from the gastrectomy to the development of neurological symptoms was 9.1 yr. A longer interval of 14 yr was associated with the development of neurological signs. There were 43 various nervous system signs including myopathy in 5 patients, restless leg syndrome in 12, myelopathy in 5, peripheral neuropathy in 3, cerebellar ataxia in 2, dementia in 3, epilepsy in 2, motor neurone disease in 1, and psychoneurosis in 7. There was no relationship to the type of surgical procedure and the subsequent neurological manifestations. Age, sex, and the site of the ulcer were also independent of subsequent involvement. Vitamin D deficiency was noted in 3 patients, hypokalemia in 1, and B_{12} deficiency in 3. A high incidence of intestinal malabsorption (32.4%) was noted in patients with neurological involvement. A long term follow-up is advised for gastrectomy patients.

7627 HISTOTOPOGRAPHY OF THE GLANDULAR AREAS OF THE GASTRIC MUCOSA. I. THE PYLORIC GLAND AREA IN PATIENTS WITH DUODENAL ULCER. (E.) Urban, A. (Inst. Oncol., Cracow, Poland) and J. Iwaszczyszyn. *Acta Med. Pol.* 12(3):339-350, 1971.

The histotopographical relations in the area of pyloric glands was determined in patients operated for duodenal ulcer and the degree of variation of the glandular area with respect to age and sex was ascertained. The minimal area of the pyloric glands of the gastric mucosa on the lesser curvature, anterior and posterior walls was 3.0, 2.4 and 2.5 cm, resp. The maximal area on the lesser curvature was up to 10 cm from the pylorus, and 10.8 cm on both walls. Mean values showed that the extent on the line of the lesser curvature and posterior wall was 6.2 cm and 6.0 cm on the anterior wall. In more than 50% of cases the area of the pyloric glands was situated between 5-7 cm from the pyloric line. In 17 cases of duodenal ulcer complicated by pyloric stenosis, the area of the pyloric glands tended to shift toward the body of the stomach, especiall on the posterior wall. With age, the area of the pyloric glands also showed a tendency to shift toward the body of the stomach but especiall on the axis of the lesser curvature. The area of the pyloric glands was somewhat larger in men than in women but due to the small sample size, the data were not comparable. Distinct individual variation could be seen in the area of the pyloric glands with the gastric mucosa in 12 cases in which 3 measurements were made.

7628 HISTOTOPOGRAPHIC STUDIES ON THE GLANDULAR AREA OF THE GASTRIC MUCOSA. II. THE INTERMEDIATE PART IN PATIENTS WITH DUODENAL ULCER. (E.) Urban, A. (Inst. Oncol., Cracow, Poland) and J. Iwaszczyszyn. *Acta Med. Pol.* 12(3):351-355, 1971.

The area of the intermediate zone in patients with duodenal ulcer was determined in relation to the age and sex of the patients. The mean area of the intermediate part in these patients was about 1 cm with considerable variation in area side and had the shape of a zone separating the glandular mucosa of the fundus from the area of pyloric glands, which varied in extent but not shape. The intermediate layer did not increa in width toward the proximal part of the mucosa (i.e. does not shift toward the cardia). In the group above middle age (45 yr) only a small displacement of the area of the intermediate zone was observed and was confined to the anterior wall. Information concerning differences related to sex were not concluded but the number of cases differed markedly within each group of men

(91 cases) and women (13 cases) and provided only general information.

7629 DIVERSE ETIOLOGIES OF HEMORRHAGES FROM THE UPPER GASTROINTESTINAL TRACT. (Ger.) Sachweh, D. (Univ. Surg. Clin., Cologne, Germany), J. Medrano and A. Larena. *Bruns Beitr. Klin. Chir.* 218(7):593-601, 1971.

7630 ROENTGENOLOGIC PICTURE OF HYDROCHLORIC ACID CORROSION OF THE STOMACH AND ITS PATHOLOGIC PARALLELS. (Ger.) Treichel, J. (Free U. Steglitz Clin., Berlin) and H. N. Macha. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1): 120-122, 1971.

7631 ULCER RECURRENCE AFTER VAGOTOMY. (Fr.) Adloff, M. (CHU Ist Gen. Surg. Serv., Strasbourg, France), J. J. Kohler and F. Otteni. *J. Med. Strasbourg* 2(3):207-214, 1971.

7632 SOME TECHNICAL ASPECTS IN THE DEMONSTRATION OF GASTRIC LESIONS. (E.) Hanelin, J. (Tufts U. Med. Sch., Boston, Mass.). *Semin. Roentgenol.* 6(2):235-253, 1971.

7633 A NOTE ON THE USE OF ANTICHOLINERGICS IN THE MANAGEMENT OF DUODENAL ULCERATION. (E.) Bock, O. A. A. (U. Stellenbosch Gastrointest. Clin., South Africa). *S. Afr. Med. J.* 45(24):658-660, 1971.

7634 DUODENAL ULCER IN FOREIGN WORKERS IN GERMANY. (Ger.) Von Zedtwitz, J. (Old Cottage, Leukerbad, Switzerland). *Aerztl. Prax.* 23(46):2556, 1971.

7635 THE DETERMINATION OF NOCTURNAL BASAL SECRETION IN PATIENTS WITH DUODENAL ULCER. (Ger.) Kahl, H. (Reg. Hosp., Magdeburg, Germany). *Z. Gesamte Inn. Med.* 26(12):400-404, 1971.

7636 VAGOTOMY ASSOCIATED WITH ANTRECTOMY IN THE TREATMENT OF GASTRODUODENAL ULCER. (Rum.) Stoica, T. (Adulti I Hosp., Braila, Rumania). *Chirurgia (Bucur.)* 20(5):407-420, 1971.

7637 RECURRENT ULCER COMPLICATED BY DIGESTIVE HEMORRHAGE AFTER TRUNK VAGOTOMY AND PYLOROPLASTY. (WITH REFERENCE TO TWO CASES). (Fr.) Ghoti, M., A. Touzani and A. Benabadji. *J. Med. Maroc* 7(3):107-109, 1971.

7638 PEPTIC ULCER OF THE ESOPHAGUS. (Rus.) Berezov, I. E., I. V. Varshavski and V. R. Anakhasian. *Grud. Khir.* 13(3):99-105, 1971.

7639 OUTPATIENT TREATMENT IN THE DISPENSARY OF ULCER PATIENTS AND THE FREQUENCY OF PERFORATION. (Rus.) Korzon, I. K. *Vestn. Khir.* 106(5):132-135, 1971.

7640 MISDIAGNOSIS OF DUODENAL ULCER CAUSED BY ATYPICAL APPEARANCE OF THE PAPILLA OF SANTORINI. (Ger.) Tille, D. (Dist. Hosp., Hameln, Germany) and P. Wilhelm. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(1):128-129, 1971.

7641 PEPTIC ULCER SURGERY. (Ger.) Van Ackeren, H. (Marien Hosp., Hamburg, Germany), M. Rehner and H. W. Schreiber. *Med. Heute* 20(13):8-12, 1971.

7642 ADRENOCORTICAL STEROID THERAPY AND PEPTIC ULCER. (Jap.) Chin, K. (Tokyo U. Sch. Med.), H. Kameda and H. Yamaguchi. *Jap. J. Clin. Med.* 29(1):125-32, 1971.

7643 A POSSIBLE VASCULAR FACTOR IN THE AETIOLOGY OF DUODENAL ULCERATION. (E.) Piasecki, C. (Roy. Free Hosp. Sch. Med., London). *Br. J. Surg.* 58(9):660-662, 1971.

7644 SURGICAL MANAGEMENT OF POST BULBAR DUODENAL ULCERS. (60 CASES). (Fr.) Bertrand, P., R. Lombard Platet and M. Philippe. *Lyon Chir.* 67(3):161-168, 1971.

7645 SURGICAL APPROACH IN UPPER GASTROINTESTINAL HEMORRAAGES FROM GASTRODUODENAL ULCER. (Rum.) Mandache, F. (Brincovenesc Hosp., Bucharest, Rumania) and M. Vasiliu. *Chirurgia (Bucur.)* 20(6):495-502, 1971.

7646 VAGOTOMY: ANOTHER FALSE STEP IN SURGERY? (Ger.) Bunte, H. (U. Erlangen Surg. Clin., Germany). *Dtsch. Med. Wochenschr.* 96(15): 633-640, 1971.

See also numbers: 7293, 7511, 7610, 7720, 7793, 8070

7647 TRANSPLANTATION OF SMALL BOWEL IN THE RAT: TECHNICAL AND IMMUNOLOGICAL CONSIDERATIONS. (E.) Monchik, G. J. (New York Hosp-Cornell Med. Ctr., N. Y.) and P. S. Russell. *Surgery* 60(5):693-702, 1971.

The potential 2-way responsiveness in allogeneic transplantation between different inbred rat strains was investigated and the isolation of unidirectional host versus-graft (HVG) and graft-versus-host (GVH) reactions induced by small bowel transplants in various parental and F_1 hybrid strain donor-recipient combinations is reported. No difference in the ability of the various strains to withstand the operation was observed, the operative mortality being 21-25%. A constant finding in the graft after revascularization was the presence of large amounts of a turbid, viscus, alkaline fluid in the lumen, which may represent "paralytic secretion." Allografts between rat strains which differed at the Ag-B locus sensitized the host, thus the allograft was rejected and the recipient died by the twelfth postoperative day. GVH reactions, which occurred only in parental-to-F_1 transplants and caused the death of the recipient within 20 days, were prevented by donor X-irradiation with 700 r before transplantation. Thus, when the recipient animal is unable to reject a graft, a lethal GVH reaction occurs, seemingly mediated by immunologically competent lymphocytes in the transplanted organ.

7648 INTRAMURAL CYSTS OF THE ILEUM. (E.) Collins, C. D. (Bristol Roy. Infirm., England), L. Low and A. C. Hunt. *Gut* 12(10): 801-803, 1971.

A case of intramural cysts of the ileum (cystica profunda of the ileum) which occurred in a 42 yr-old male with intestinal obstruction is presented. The bowel formed a saccular dilatation distal to a short annular thickening of the wall approximately 35 cm proximal to the ileocecal valve. The rest of the ileum proximal to the lesion appeared dilated, thickened, somewhat injected, and the mesentery attached to it was thickened up to 3 cm in places and contained enlarged fleshy lymph nodes. Six circumferentially arranged intramural cysts of varying diameter (0.3 - 1.5 cm) were found 4 cm distal to a submucosal cyst (1.6 cm) located at the commencement of the dilatation. Some of the cysts contained mucus, others a soft, cheesy material. The cysts were buried in the muscularis whicy was compressed and thinned on either side of them. No inflammatory changes were seen in the specimen. Lymphatic obstruction may be the cause and not the effect of the intramural cysts as suggested by the persistence of edema 10 months after removal of the abnormal bowel segment.

7649 INTRAMURAL JEJUNAL HAEMATOMA AFTER PERORAL MUCOSAL BIOPSY IN A CHILD WITH INTESTINAL MALROTATION. (E.) Ahmed, S. (Roy. Manchester Child. Hosp., England) and R. G. Patel. *Arch. Dis. Child.* 46(249):723-724, 1971.

About 48 hr after peroral mucosal biopsy a 14-month-old child with intestinal malrotation became pyrexic and vomited copious amounts of bile. On abdominal examination there were numerous visible intestinal loops, and a mass in the right upper abdomen. On opening the abdomen through a right upper paramedian incision, the proximal 12 cm of the jejunum was found to be the site of a large intramural hematoma which extended up to the duodenojejunal flexure. Ladd's operation was performed and the involved jejunal segment was resected with end-to-end duodenojejunal anastomosis. Recovery was uneventful. The entire thickness of the bowel was involved in this case. A shearing stress produced by the biopsy capsule, with indirect injury to blood vessels, extravasation and hematoma formation seems to be the most likely mechanism. The radiologic demonstration of intestinal malrotation demands surgical treatment and must be considered a contraindication to peroral biopsy.

7650 OEDEMA AT THE SITE OF SMALL-BOWEL ANASTOMOSES. (E.) Shields, M. A. (Monash U. Med. Sch., Victoria, Australia) and H. A. F. Dudley. *Br. J. Surg.* 58(8):598-600, 1971.

The pattern of development and regression of edema in the area of a standard end-to-end anastomosis in the small intestine over the first 96 hr after operation was studied in rabbits. At 96 hr, Masson trichrome staining showed that the fibrinous exudate was beginning to contain collagen, and there was definite positive staining for collagen in the submucosa. There was no difference in edema between the site of anastomosis and the remainder of the intestine until after 48 hr, after which the edema in the unoperated bowel began to decrease. When compared with control tissue, there was enough edema in the area of anastomosis to cause a 5-10% increase in the tissue weight. Thus, in anastomoses of already critical size the combination of inversion, edema and clot may lead to acute, if temporary, occlusio

7651 BLIND-LOOP REFLUX IN RELATION TO WEIGHT LOSS IN OBESE PATIENTS TREATED WITH JEJUNOILEAL ANASTOMOSIS. (E.) Quaade, F. (Bispebjerg Hosp., Copenhagen), E. Juhl, K. Feldt-Rasmussen and H. Baden. *Scand. J. Gastroenterol.* 6(6):537-541, 1971.

In 10 patients on whom jejunoileal anastomosis was performed for the treatment of obesity, the predominant postoperative radiographically demonstrable trend was slowness of passage, applying not only to gastric emptying time, but also to small intestine transit time, both minimum and maximum. Rate and degree of weight loss showed no correlation with gastric emptying time, small intestine transit time, or degree and duration of reflux to the excluded ileum. Five patients with a preoperative weight of 130 kg or less stabilized their weight near the normal level after 12-24 months. The most obese patients with an initial weight of 147-180 kg showed the same pattern, and lost the same amount of weight, with the result that they stabilized at a much higher level. A more effective treatment of patients with extreme obesity should consist in shortening of the intestine left in function, and not in an extended surgical procedure aiming at avoiding reflux into the blind loop.

7652 RAPID DETECTION OF Clostridium perfringens ENTEROTOXIN IN A MODIFIED LIGATED INTESTINAL LOOP TECHNIQUE IN RABBITS. (E.) Hauschild, A. H. W. (Dept. Natl. Health Welfare Food Drug. Directorate Res. Labs., Ottawa, Ontario, Canada), R. Hilsheimer and C. G. Rogers. *Can. J. Microbiol.* 17(11):1475-1476, 1971.

Enterotoxin from Clostridium perfringens type A was measured using a modified intestinal loop technique in rabbits. The loops were ligated and injected. The incubation time was decreased from 6 hr to 90 min, and the animals were kept under halothane anesthesia during this period. The fluid volume in the saline control loops decreased within 90 min but only small volume changes occurred in the loops injected with enterotoxin. The fluid volumes after 90 min of incubation increased linearly with the log concentration of the toxin. Normal rabbit serum had no effect on the fluid volume in loops injected with enterotoxin. However, in loops containing a mixture of cell extract from sporulated cells of C. perfringens and inmune serum (1:9), only 1.0 ± 0.4 ml of fluid remained after 90 min. Since the absorbed antiserum was enterotoxin-specific, the observed differences in fluid volume were due to the action of the enterotoxin. During the first 90 min of incubation, the effect of the enterotoxin counteracts the removal of fluid from the intestinal lumen. The advantages of this modified method are that it reduces the time of the experiment and is more sensitive and more humane than the standard loop technique, since the animals remain under anesthesia.

7653 MECHANISM OF OBSTRUCTION IN CARCINOID TUMORS OF THE SMALL INTESTINE. (E.) McNeal, J. E. (Herrick Hosp., Berkeley, Calif.). *Am. J. Clin. Pathol.* 56(4):452-458, 1971.

The characteristics of 3 clinically obstructing small intestinal carcinoid tumors removed at surgery and 3 incidental intestinal carcinoids found at autopsy were studied histologically. In the 3 surgical specimens the region of the tumor showed an abrupt kinking marked by a deep crease halfway between the mesenteric and antimesenteric borders. Sections through this crease revealed a somewhat hypertrophied muscularis and diffusely thickened white to pale yellow tissue in the submucosal and subserosal tissues. This represented tumor and scirrhous reaction but did not form a discrete nodule. This crease prevented the gross recognition of the tumor but indicated its exact location. The 3 autopsy tumors were all discrete mucosal nodules which microscopically had well demarcated margins and invaded a short distance into the inner coat of the muscularis. The bulk of the tumor in each case lay in the submucosa where it formed a flat, button-like mass, and no scirrhous reaction was seen in any case. These 3 cases were also accompanied by diffuse hypertrophy of the inner muscle layer sharply limited to the area of tumor penetration. Obstruction of the intestine by carcinoid tumors seems to be caused by a kinking which was apparently produced by lateral growth of the submucosal tumor with traction on the underlying muscularis.

7654 VASCULAR INSUFFICIENCY OF THE INTESTINES. (E.) Williams, L. F., Jr. (Boston U. Med. Ctr., Mass.). *Gastroenterology* 61(5): 757-777, 1971.

The etiology, pathophysiology, diagnosis, and therapy of intestinal ischemia is reviewed. The distribution of the lesion along the intestine, the degree of involvement of the wall of the ischemic segment, and the rapidity of the process vary widely with differing etiologies. Although acute mesenteric ischemia can be suspected on the basis of the history and physical examination, a firm diagnosis of its presence and specific etiology usually requires detailed radiologic study including arteriography and barium studies and/or surgical exploration. One of the most characteristic findings with gut ischemia is the lack of significant abdominal abnormalities even when the pain is unbearable. Laboratory findings are not of differential help. Specific ischemic syndromes, the diagnosis and treatment of which are discussed, include arterial emboli, acute venous occlusion, atherosclerotic obstructions of the superior mesenteric artery, occlusions of the small arteries and ischemia of short segments of intestine, miscellaneous abnormalities of the intestinal arteries, celiac axis obstructions not due to atherosclerosis, nonocclusive mesenteric ischemia (a perfusion defect), and ischemic colitis involving the inferior mesenteric artery.

7655 COMPARATIVE EFFECTS OF ENTEROTOXINS FROM Escherichia coli AND Vibrio cholerae ON RABBIT AND SWINE SMALL INTESTINE. (E.) Moon, H. W. (US Dept. Agric. Natl. Anim. Dis. Lab., Ames, Iowa), S. C. Whipp, and A. L. Baetz. *Lab. Invest.* 25(2):133-140, 1971.

Enterotoxins from Escherichia coli and Vibrio cholerae caused accumulation of intraluminal fluid in ligated loops of ileum from 9-week-old rabbits and jejunum from 2-week-old, colostrum-deprived pigs. There were no gross qualitative differences in responses to the 2 toxins, and light microscopy revealed similar histologic changes in pigs and rabbits. Lesions included fibrinous serositis, distended lamina propria and villi and, at 8 hr, frequent submucosal edema and congested submucosal veins. Also seen in loops exposed to both toxins were discharge of goblet cell mucus and focal erosion with acute inflammation of the lamina propria which occurred commonly at 16 hr but rarely at 8 hr. The villous absorptive, enterochromaffin, Paneth, and undifferentiated crypt cells appeared to be normal in both toxin-exposed and control loops. Intraluminal fluid was lower in protein, Mg^{++}, and Ca^{++} and higher in K^{+}, Na^{+}, and HCO$_3^-$ than serum. These results support the hypothesis that the pathogenesis of enterosorption that is caused by both enterotoxins is the same.

7656 SMALL BOWEL IN TYPHOID FEVER. (E.) Chuttani, H. K., K. Jain and R. C. Misra (Gen. Hosp., Birmingham, England). *Gut* 12(9):709-712, 1971.

The morphological status and residual function of the small intestine following recovery from an acute case of typhoid fever was assessed in 28 patients with typhoid fever and 1 patient with paratyphoid fever. Urinary D-xylose excretion was subnormal in 14 of 29 patients and appreciably increased with retesting after 1 week in 12 patients tested. The average fecal fat excretion was never above normal limits. Jejunal biopsies were taken in 22 patients. Normal biopsies (14 patients) showed tall and slender villi, columnar epithelium, and cellular infiltrate of lymphocytes, monocytes and plasma cells in the lamina propria. Biopsies with mild borderline abnormalities (6 patients) consisted of increased cellular infiltration with normal villous architecture. The mixed infiltrate was more compact in the basal mucosa and around the crypts of Gakeazzi-Lieberkuhn, gradually became less towards the villous core, and consisted of mononuclear histiocytes and lymphocytes. Abnormal biopsies (2 patients) showed variable length, mostly short and broad unscalloped villi with rounded crypts. The surface epithelium showed increased, more dense infiltration and was cuboidal in places. Barium meal roentgenograms were normal in 24 of 28 patients. These patients showed flocculation and sedimentation of the barium while 1 showed prominent mucosal folds. Acute injury due to salmonellosis occurs quickly and results in only mild functional derangement of the small intestine which recovers quickly.

7657 OVARIAN TUMORS: AN EXTENSION OF THE PEUTZ-JEGHERS SYNDROME. (E.) Christian, C. D. (U. Arizona Coll. Med., Tucson). *Am. J. Obstet. Gynecol.* 111(4):529-534, 1971.

A review of the literature with 15 references and discussion.

7658 COMPOSITION AND BILE SALT TRANSFORMING CAPACITY OF THE BACTERIAL FLORA OF ILEAL EFFLUENT IN PATIENTS WITH ILEOSTOMIES. (E.) Percy-Robb, I. W. (Roy. Infirm., Edinburgh, Scotland), W. A. Telfer Brunton, J. C. Gould, K. N. Jalan, J. P. A. McManus and W. Sircus. *Scand. J. Gastroenterol.* 6(7):625-630, 1971.

A variety of aerobic and anaerobic organisms were isolated from the ileal effluent in 4 patients with ileostomies. Streptococcus and Gram-negati
coliform bacilli were present in all specimens, Staphylococcus albus and Candida were isolated in small numbers, and Staphylococcus pyogenes or Lactobacillus acidophilus were not seen. Anaero
included Clostridium welchii, Bacteroides necrophorus and B. fragilis and Veillonella species. Deconjugation of sodium taurocholate was demonstrated for all of the Bacteroides and Clostridium strains; dehydroxylation was not observed in any of the organisms. Following incubation of fecal suspensions from normal subjects, 95-100% of the radioactive taurocholate was found to be deconjugated and, in addition, radioactivity was found in the deoxycholic acid recovered from cultures. The reason for the failure to effect 7 α-dehydroxylation may be that the flora is exposed to the intestinal contents for a relatively short time in patients with ileostomies.

7659 MULTIPLE NECROTIZING INTESTINAL INFARC
(Sp.) Ludmer, B. *Bol. Soc. Argent. Cir.* 32(1):19-26, 1971.

7660 NEUROFIBROSARCOMA OF THE DUODENUM. (E.) Clapp, W. A. (Cent. Maine Gen. Hosp., Lewiston) and R. Haas. *J. Maine Med. Assoc.* 62(3):55-56, 1971.

7661 INTESTINAL VOLVULUS SECONDARY TO A VENTRICULOPERITONEAL SHUNT. CASE REPORT. (E.) Sakoda, T. H. (U. Kansas Med. Ctr., Kansas City), J. A. Maxwell and C. E. Brackett, Jr. *J. Neurosurg.* 35(1):95-96, 1971.

7662 NEURILEMMOMA OF THE JEJUNUM AS THE CAUSE OF BLEEDINGS FROM THE ALIMENTAR
TRACT. (Pol.) Gajda, J. (Dist. Hosp., Lidzbar
Poland). *Pol. Przegl. Chir.* 43(5):765-767, 197

7663 AGE AND THE TESTIS AFTER RESECTION OF THE SPERMATIC CORD IN THE REPAIR OF INGUINAL HERNIA. (E.) Heifetz, C. J. (Jewish Hosp., St. Louis, Mo.). *Am. J. Surg.* 121(6):634-636, 1971.

7664 INTESTINAL FISTULA AFTER PELVIC IRRADIATION AND RADICAL SURGERY. (E.) Fortner, J. G. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.), E. J. Beattie, Jr. and M. J. Casey. *Postgrad. Med.* 50(1):168-171, 1971.

7665 WATER AND SALT METABOLISM IN ACUTE INTESTINAL OBSTRUCTION. (Rus.) Matiushin, I. F. and G. A. Maksimov. *Eksp. Khir. Anestesiol.* 16(3):20-23, 1971.

7666 MECKEL'S DIVERTICULUM IN CHILDREN (SURVEY OF 17 CASES). (Fr.) Deleghe**r**, Y. (Brugmann Univ. Hosp., Brussels, Belgium). *Acta Chir. Belg.* 70(1):30-44, 1971.

7667 ILEAL REVERSAL TO COMPENSATE FOR THE LOSS OF THE ILEO-CAECAL VALVE. (E.) O'Reilly, K. (Mater Misericordiae Hosp., Brisbane, Australia). *Med. J. Aust.* 1(15):805-806, 1971.

7668 GARDNER'S SYNDROME: A REPORT OF FOUR CASES. (E.) Leichtling, J. J. (Mt. Sinai Sch. Med., New York, N. Y.). *Mt. Sinai J. Med.* 38(3):311-323, 1971.

7669 EXTERNAL DUODENOSTOMY, AFTER PARTIAL GASTRECTOMY, IN THE DUODENAL STUMP PRESENTING DIFFICULTIES OF ITS CLOSURE. (Pol.) Dabrowski, W. (Milit. Hosp., Tomaszowie Mazow, Poland) and J. Kolasa. *Pol. Przegl. Chir.* 43(3): 489-493, 1971.

7670 A CASE OF PHLEGMONOUS SEGMENTAL ENTERITIS. (Rum.) Balcu, G. (United Hosp., Vaslui, Rumania), P. Benes and N. Burcoveanu. *Rev. Med. Chir. Iasi (Rmmna)* 75(1):217-219, 1971.

7671 DRAINAGE OF THE SMALL INTESTINE IN THE SURGICAL TREATMENT OF INTESTINAL OBSTRUCTION. (Rus.) Androsov, N. S. *Vestn. Khir.* 106(5):40-43, 1971.

7672 INFLAMMATORY DISEASES OF THE COLON. (Sp.) Garcia Marrero, L. and J. Marcos Lopez. *Radiologia (Madr.)* 13(2):119-132, 1971.

7673 DIAGNOSIS OF ACUTE INTESTINAL OCCLUSION. (Fr.) Martinel, C. *Rev. Med. Toulouse* 7, Pt. 2(5):855-870, 1971.

7674 ABOUT 38 OBSERVATIONS OF MECKEL'S DIVERTICULUM. (Fr.) Devic, G., J. Garde and J. Gelain. *Lyon Chir.* 67(3):169-172, 1971.

7675 A SINGLE LAYER INTESTINAL SUTURE. (Pol.) Golab, W. (Med. Acad. Ist Surg. Clin., Zabrze, Poland), K. Smigla and M. Pardela. *Pol. Przegl. Chir.* 43(3):495-501, 1971.

7676 TRAUMATIC PARTIAL RUPTURE OF DUODENUM WITH OCCLUSION BY HEMATOMA IN THE WALL. (Fr.) Devic, G., J. Garde and J. Gelain. *Lyon Chir.* 67(3):208-209, 1971.

7677 REPORT OF A NEW CASE OF OCCLUSIVE TRAUMATIC HEMATOMA OF THE DUODENUM. (Fr.) Desjacques, P., B. Miguet and T. Kalonji. *Lyon Chir.* 67(3):209-211, 1971.

7678 TRAUMATIC INTERSTITIAL RUPTURE OF THE THIRD PART OF THE DUODENUM WITH COMPRESSIVE HEMATOMA IN THE WALL. (Fr.) Pouyet, M., J. Balatre and D. Tomada. *Lyon Chir.* 67(3):213, 1971.

7679 DIVERTICULOSIS AND MUSCULAR HYPERTROPHY OF THE SMALL INTESTINE OF HORSES, PIGS AND SHEEP. (E.) Cordes, D. O. (Ruakura Anim. Health Lab., Hamilton, New Zealand) and H. F. Dewes. *NZ Vet. J.* 19(5):108-111, 1971.

7680 A BYPASS OPERATION FOR OBESE HYPERLIPIDEMIC PATIENTS. (E.) Buchwald, H. (U. Minnesota Health Scis. Ctr., Minneapolis) and R. L. Varco. *Surgery* 70(1):62-70, 1971.

7681 LEIOMYOSARCOMA OF THE ILEUM. (E.) Mathur, K. S. (S.N. Med. Coll., Agra, India), D. K. Hazra and M. M. Singh. *Indian J. Med. Sci.* 25(3):180-182, 1971.

7682 A RADIOLOGICAL REVIEW OF DUODENAL DISEASE. (E.) Craig, J. O. M. C. (St. Mary's Hosp., London). *Ir. J. Med. Sci.* 140(5):210-225, 1971.

7683 AN EXPERIMENTAL STUDY OF INVERTING INTESTINAL ANASTOMOSES. (E.) Nagaya, T. (Nagoya U. Sch. Med., Japan). *Nagoya J. Med. Sci.* 34(1):41-68, 1971.

7684 PRIMARY DUODENAL CARCINOMA. (Pol.) Lazecki, L. (Med. Acad. Inst. Roentgenol., Warsaw, Poland). *Wiad. Lek.* 24(6):519-524, 1971.

7685 DEFICIENCY OF INTESTINAL LACTASE IN THE PATHOPHYSIOLOGY OF THE INTESTINE. (Fr.) Nicolaescu, T. (D. Danielopolu Acad. Med. Sci., Bucharest, Rumania), P. Stoiculescu and E. Bittman. *Rev. Roum. Physiol.* 8(2):129-133, 1971.

7686 A FRESH CASE OF CARCINOID TUMOR OF THE DUODENUM. (Fr.) Adloff, M. (CHU Gen. Surg. Clin. A, Strasbourg, France), M. Lampert and E. Nouzha. *Chirurgie* 97(6):405-408, 1971.

7687 ATRESIAS OF THE SMALL INTESTINE. II (Fr.) Daudet, M. (Edouard Herriot Hosp., Lyon, France), A. Pichon, J. P. Chapuis and M. Crouzet. *Cah. Med. Lyon* 47(23):2543-2565, 1971.

7688 ILEUS FROM INTESTINAL INCARCERATION IN GAPS OF THE GREATER OMENTUM. (Ger.) Schroder, H. J. (Altona Gen. Hosp., Hamburg, Germany). *Chir. Praxis* 15(2):225-228, 1971.

7689 COINCIDENCE OF A SEVERE TROPHIC ILEITIS AFTER RADIUM THERAPY WITH A CARCINOID TUMOR IN THE SAME SECTOR OF INTESTINE. (Ger.) Gunter, H. (Rudolfstift Hosp., Vienna) and M. Redtenbacher. *Bruns Beitr. Klin. Chir.* 218(7): 655-656, 1971.

7690 OCCULT SMALL BOWEL TUMOURS: THEIR DIAGNOSTIC FEATURES AND MANAGEMENT. (E.) Aubrey, D. A. (Roy. Infirm., Cardiff, Wales), L. H. Blumgart, G. T. Davies and I. H. Gravelle. *Br. J. Surg.* 58(9):678-684, 1971.

7691 NEONATAL HEMORRHAGIC NECROSIS OF INTESTINAL MUCOUS MEMBRANE. REPORT OF A CASE. (Fr.) Duyck, E. M. (St. Niklaas Clin., Kortrijk, Belgium), G. De Bethuné, E. Van Maele and A. Mertens. *Arch. Fr. Pediatr.* 28(5):545-552, 1971.

7692 SMALL BOWEL INJURIES IN CHILDREN AFTER BLUNT ABDOMINAL TRAUMA. (E.) Kakos, G. S. (Ohio State U. Hosp., Columbus), J. L. Grosfeld and T. S. Morse. *Ann. Surg.* 174(2): 238-241, 1971.

7693 A CASE OF PEUTZ JEGHERS SYNDROME ACCOMPANYING DEVELOPMENT OF MALIGNANT GROWTH. (Jap.) Suzuki, T. (Women's Med. Coll., Tokyo, Japan), H. Orihata and J. Yamanaka. *Tokyo Joshi Ikadaigaka Zasshi (J. Tokyo Wom. Med. Coll.* 41(5):375-380, 1971.

7694 VOLVULUS OF THE SMALL INTESTINE DUE TO MALROTATION OCCURRING IN LATE ADOLESCEN A CASE REPORT. (E.) Deodhar, S. D. (Seth G. S. Med. Coll., Bombay, India). *J. Postgrad. Med.* 18(3):142-144, 1971.

7695 MECKEL'S DIVERTICULUM AS CAUSE OF ACUTE ABDOMEN IN THE NEWBORN PERIOD. (Ger.) Lang, H. D. (Med. Acad. Surg. Clin., Magdeburg, Germany) and H. Vinz. *Chirurg* 42(6):276-278, 1971.

7696 INTESTINAL ABSORPTION OF OLIGOPEPTIDES IN CYSTINURIA. (E.) Asatoor, A. M. (Westminster Med. Sch., London), M. R. Crouchman and A. R. Harrison. *Clin. Sci.* 41(1):23-33, 197

See also numbers: 7205, 7206, 7207, 7498, 7516, 7522, 7525, 7584, 7597, 7615, 7616, 7622, 7624, 7633, 7643, 7788, 7795, 8023

REGIONAL ENTERITIS

7697 AZATHIOPRINE (IMUREL) THERAPY IN CROHN'S DISEASE. (E.) Fausa, Ö. (Univ. Hosp., Oslo, Norway) and E. Gjone. *Acta Med. Scand.* 190(3):211-212, 1971.

Nine patients with active Crohn's disease for 1½ to 10 yr were treated with azathioprine (Imurel) for periods ranging from 3½ to 12 months. Treatment produced improvement in 7 patients, 6 of whom returned to work. There was healing in 2 of the 3 patients with fistulae. Azathioprine treatment may be useful in recurrent cases of Crohn's disease where previous surgery precludes further resection, or if extensive lesions make the patient unsuitable for surgery. Treatment may also be of value to improve the condition of patients before surgery, and in all cases of inoperable fistulae. All cases tolerated the drug without signs of bone marrow depression; 1 patient suffered increased loss of hair. Cortic steroid (prednisone) therapy was given in addition to azathioprine in 6 of the patients. Dosage of azathioprine, based on body weight, varied between 75 and 200 mg per day.

7698 EARLY OR LATE OPERATION IN THE TREATME OF CROHN'S DISEASE. (E.) Krause, U. (Univ. Hosp., Uppsala, Sweden). *Scand. J. Gastroenterol.* 6(6):479-481, 1971.

The possibility of reducing the recurrence rate of Crohn's disease by the introduction of radica surgery at an early stage in the disease is raised. The recurrence rate after surgical treatment of Crohn's disease has been reported to be between 20 and 60%. Although conservative medical treatment may improve the general state in an acute attack, the long-term results indicate a higher incidence of complications and even a higher death rate after corticosteroid treatment than after rest and diet only. Eighty to 90% of all patients treated medically sooner or later require surgical intervention as a result of complications. The recurrences after radical resections have shown a better prognosis in the long term than those after non-radical resections. There is much evidence indicating that a spread will occur during conservative treatment. In favor of an early operation are the factors that a macroscopically larger anatomic extent of the disease is probably associated with a higher incidence of recurrences, and that a macroscopically radical resection in a patient with a large involvement of gut means a very large resection with a higher risk of postoperative malabsorption. The only way to resolve this question is to operate every second patient early, i.e. as soon as a true diagnosis of Crohn's disease is made, and the others late (after severe complications).

7699 SURGICAL MANAGEMENT OF REGIONAL ENTERITIS. (E.) Glotzer, D. J. and W. Silen (Beth Israel Hosp., Boston, Mass.). *Gastroenterology* 61(5):751-756, 1971.

The surgical management of regional enteritis involving predominantly the small intestine is reviewed. Operative therapy is generally reserved for the complications of the disease, rather than occupying a role as the primary modality of treatment. The advantages and disadvantages of resection and the exclusion bypass procedures in the treatment of regional ileitis are compared. The complications which are considered as possible indicators for surgical management include acute enteritis, obstruction, fistulae, anal fistulae and abscesses, free perforation and abdominal abscess and perforation. Although true availability of antibiotics and better physiological and metabolic management have improved the short-term outlook, surgical therapy of regional enteritis has not otherwise advanced significantly in the last 25 yr. Surgical therapy seems to have reached its limits in regional enteritis unless advances in transplantation make it possible to replace intestine so extensively involved as to render the patient a nutritional cripple.

7700 THE PLACE OF SURGERY IN CROHN'S DISEASE. (E.) Williams, J. A. (Gen. Hosp., Birmingham, England). *Gut* 12(9):739-749, 1971.

The surgical management of patients with Crohn's disease is reviewed (68 references). The clinical picture in acute ileitis is often similar or identical to that of acute appendicitis and is usually diagnosed at laparotomy by the appearance of a thickened, inflamed terminal ileum. Over 90% of patients diagnosed as acute ileitis at laparotomy never manifest the signs of chronic Crohn's disease. Appendectomy in this group of patients seems warranted in that it would enable acute appendicitis to be excluded from the differential diagnosis in any future attack. Free perforation into the peritoneal cavity is a rare complication of Crohn's disease. Surgery should be used in Crohn's disease in the management of its complications which include anemia and bleeding, abscess formation, fistula formation and perianal complications. The particular implications of Crohn's colitis are discussed. Surgical techniques include excision and bypass, with most surgeons favoring excision. The incidence of recurrence and mortality after surgery reported by various investigators are compared.

7701 CROHN'S DISEASE. TREATMENT BY CORTICOSTEROIDS, ANTIBIOTICS AND PSYCHOTHERAPY. (E.) Paulley, J. W. (Ipswich Hosp., England). *Psychother. Psychosom.* 19(1-2):111-117, 1971.

7702 THE SURGICAL TREATMENT OF INTESTINAL PERFORATION INTO THE PERITONEAL CAVITY IN CROHN'S DISEASE. (Fr.) Menguy, R. (Univ. Chicago Sch. Med., Ill.). *Chirurgie* 97(4): 205-214, 1971.

7703 LIVER IN CROHN'S DISEASE. (E.) Anonymous. *Br. Med. J.* 3(5773):491, 1971.

7704 URETERAL STENOSIS AND REGIONAL ILEITIS. (Ger.) Pum, H. (Gen. Polyclin., Vienna). *Acta Chir. Austria* 3(2):51-54, 1971.

See also numbers: 7790, 7570, 7771, 7789, 7790

7705 RELATIONSHIP BETWEEN FAECAL BILE ACIDS, ABSORPTION OF FAT AND VITAMIN B_{12}, AND SERUM LIPIDS IN PATIENTS WITH ILEAL RESECTIONS. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.). *Eur. J. Clin. Invest.* 1(6):452-460, 1971.

Ileal dysfunction was not present in the 3 patients with incomplete resection of the terminal ileum (IIR), while 3 of 7 studies on the 9 patients with complete terminal ileum resections (CIR) showed reduced vitamin B_{12} absorption. The mean fecal fat excretion was higher after CIR than after IIR, or in controls, and fecal bile salt excretion was normal in patients with IIR. Most patients with CIR showed bile salt excretion values 2-12 times higher than normal, not dependent on body weight, and further augmented by cholestyramine administration. The length of ileal resection bore no relation to the fecal bile salt loss, which correlated with fecal mass, fecal fat and vitamin B_{12} absorption. Fecal bile acids were a sensitive index of ileal dysfunction in patients with CIR. However, no abnormality in fecal bile acids was present in patients with IIR. Low β-sitosterol levels in the jejunum of IIR patients suggested that the intestinal contents were diluted and explained the subnormal levels of cholesterol and total lipids. In CIR, β-sitosterol and bile salt concentrations were reduced, presumably due to increased biliary excretion. In both CIR and IIR, the relative micellar solubilization of the sterols and lipids was normal. The oil phase was increased and contained large amounts of digestion products, free fatty acids (FFA) and monoglycerides (MG). The concentration of micellar lipids and sterols did not correlate with those of bile salts. However, the molar sum of bile acids, FFA and MG did correlate with both micellar cholesterol and β-sitosterol. Micellar lipids, bile acids, and cholesterol in the intestinal pool in which β-sitosterol was dispersed, was negatively correlated with fecal bile salts and fat, while the oil phase lipids showed a positive correlation with fecal constituents. Both the absolute and relative amounts of free bile salts were higher in IIR than CIR and controls. Serum cholesterol (free and total) was subnormal in CIR while tryglycerides were not low in CIR as compared with IIR, being actually higher than controls, and serum cholesterol correlated well with micellar bile acids, and negatively with fecal bile salts and sterol balance.

7706 MICELLAR SOLUBILIZATION OF INTESTINAL LIPIDS AND STEROLS IN GLUTEN ENTEROPATHY AND LIVER CIRRHOSIS. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.) and M. Siurala. *Scand. J. Gastroenterol.* 6(6):527-535, 1971.

Micellar β-sitosterol (unabsorbable internal marker) tended to decrease, while the cholesterol concentration and distribution between the micellar and oil phases were normal in 7 patients with gluten enteropathy. Total lipids of the micellar phase were one half that in the controls, the relative amount being also low, owing to the large oil phase. In 8 patients with anicteric liver cirrhosis the intestinal cholesterol and bile salt concentrations tended to be subnormal; however, no abnormality was seen in the micellar solubilization of free or esterified sterols. In 5 icteric patients only negligible amounts of lipids were found in the micellar phase; though practically no bile salts were present, lipolysis appeared to have occurred normally. The intestina bile salt patterns are nearly identical in patients with gluten enteropathy and liver cirrhos the relative amount of deoxycholic acid tending to be subnormal. Micellar lipids and exogenous sterols correlated in liver cirrhosis and gluten enteropathy with the micellar bile salt concentration. Micellar solubilization of sterols was facilitated by the presence of monoglycerides and free fatty acids.

7707 IMPAIRED LYMPHOCYTE REACTIVITY AGAINST TUMOUR CELLS IN PATIENTS WITH COELIAC DISEASE. (E.) Maclaurin, B. P. (U. Birmingham Dept. Exp. Pathol., England), W. T. Cooke and N. R. Ling. *Gut* 12(10):794-800, 1971.

The reactivity of lymphocytes from patients with celiac disease against tumor cells was studied in vitro. When challenged with lymphoma cells (EB_2) the lymphocytes taken from these patients exhibited a marked impairment in both proliferatio and the development of cytotoxic capacity when compared to normal lymphocytes. When normal lymphocytes were grown in medium containing serum from these patients, thymidine incorporation was depressed in 8 of 10 subjects, these results being similar to those observed when lymphocytes from the celiac disease patients were grown in normal serum and medium. While the lymphocytes of 2 treated children appeared to show relatively normal responses compared with the adult control values, lymphocyte responses of 3 other infants (2 untreated, 1 treated) were markedly depressed. In the latter 3 subjects, a depressant serum factor was also demonstrated. These observations may account for the increased incidence of lymphosarcoma and other tumors observed in patients with longstanding celiac disease.

7708 INTESTINAL LYMPHOMA AND SPRUE: A SYSTEMATIC APPROACH. (E.) Dutz, W. (Pahlavi U. Med. Sch., Shiraz, Iran), S. Asvadi, S. Sadri and E. Kohout. *Gut* 12(10):804-810, 1971.

A standardized approach to intestinal lymphoma was developed by staging of the lymphoma to separate primary cases from those caused by infiltration from another site. The villous structure of the bowel in 176 necropsies of nonlymphomatous cases revealed a considerable shift from the ideally normal finger-shaped villous pattern towards leaf-like and crest-like appearances, with 15% of the adults and the children more than 1 yr of age showing convoluted and flat mucosal patterns. Of the 20 cases of primary lymphoma that could be completely analyzed, 90% (18 cases) revealed sprue-like atrophy of the mucosa (convoluted and flat). Normal mucosal patterns were observed in both patients with Hodgkin's disease and in 4 cases of gastric lymphoma. Sprue-like villous atrophy of the small intestine may be a triggering factor in the development of primary intestinal reticulum cell or lymphosarcoma.

7709 COELIAC DISEASE. REAPPRAISAL OF CLINICAL DIAGNOSIS. (E.) Cook, D. M. (Nottingham Child. Hosp., England), N. Evans, A. Lloyd and J. S. Stewart. *Arch. Dis. Child.* 46(249):705-708, 1971.

Twelve children, diagnosed previously (1959-1967) as having celiac disease, were restudied hematologically, radiologically, and by intestinal biopsy. Only 6 of 12 patients were found to have celiac disease. Symptoms, including weight loss and diarrhea, had begun before the end of the second yr of life in all but 2 of the celiac children. All but 1 had a good initial response to gluten withdrawal. Two of 6 patients with celiac disease showed low hemoglobin and 2 demonstrated decreased serum folate. Barium examination revealed dilatation of the small intestine and thick mucosal folds in 4 of the 6 celiac children. A completely flat mucosa was observed in intestinal biopsies from 4 celiac cases. Since response to diet failed to distinguish between celiacs and non-celiacs, establishing the diagnosis of celiac disease by intestinal biopsy was found to be essential. The absence of symptoms in a child previously suspected of having celiac disease, but later on a normal diet, did not exclude the diagnosis.

7710 MECHANISMS OF MALABSORPTION AND MALNUTRITION IN THE BLIND LOOP SYNDROME. (E.) Goldstein, F. (Lankenau Hosp., Philadelphia, Pa.). *Gastroenterology* 61(5):780-784, 1971.

The possible mechanisms by which small intestinal bacterial overgrowth leads to the observed malabsorption and the profound metabolic and nutritional deficiency states associated with the blind loop syndrome are reviewed. Increased bacterial concentration in the small bowel causes increased competition for dietary vitamin B_{12} (preventing its absorption), and alterations in bile salts leading to impaired micelle formation which is a prerequisite of normal fat absorption. However, in some patients there is excessive bacterial growth and steatorrhea without free bile salts in the upper small intestine indicating that other mechanisms are involved in bacterially mediated disturbances of fat absorption. In patients with the blind loop syndrome, protein and carbohydrate metabolism, and presumably absorption, are also impaired. Mucosal abnormalities which occur in these patients include increased numbers of inflammatory cells in the lamina propria and submucosa, moderate reductions in the villus-crypt ratio, and changes in the villous epithelium. Other possible mechanisms include the incomplete recovery of hydroxy acids converted from unsaturated fatty acids of dietary origin by intestinal bacteria, the effect of bacteria on amino acids, and utilization of xylose and other sugars by the organisms. Thus, bacterial utilization of major nutrients is a likely mechanism by which bacteria deprive the host of his sources of nutrition and this mechanism could significantly contribute to the profound malnutrition associated with the blind loop syndrome.

7711 DIET INDUCED JEJUNAL LIPODYSTROPHY IN THE COTTON TOP MARMOSET (*Saguinus oedipus*). (E.) Dreizen, S. (U. Texas Dent. Sci. Inst., Houston), B. M. Levy and S. Bernick. *Proc. Soc. Exp. Biol. Med.* 138(1):7-11, 1971.

A report on jejunal lipodystrophy, steatorrhea and osteomalacia produced in 4 cotton top marmosets fed on high cholesterol, coconut oil, corn oil and starch. All marmosets on this diet developed diarrhea by day 10 which consisted of copious stools, loose, light colored and fatty in appearance. No weight differences were detected in any animals consuming the test diet as compared to controls. Radiographic, histologic and biochemical evidence of osteomalacia was found in each cholesterol-coconut oil-fed marmoset and in none of the control animals. In addition to gross fractures of the tibia and fibula, bone loss throughout the axial skeleton as represented by thinning of the cortical bone, lamellation, microfractures, coarse, uneven trabecular networks and widening of the medullary canals was prominent. Enzyme and electrolyte studies were also consistent with osteomalacia. All osteomalacic marmosets showed marked structrral changes in the jejunal villi. The cytoplasmic component of the absorptive cells was displaced by large clear vacuoles which distended the cells, compressed the nucleus and made them indistinguishable from goblet cells. They were differentiated from the goblet cells by staining bright red (fat positive) with oil red O in frozen section. Mean serum cholesterol in the marmosets restricted to the high fat diet rose almost 3-fold during the feeding periods in contrast to the absence of change in the control group. No gross or microscopic manifestations of atherosclerosis were found in any of the hypercholesteremic or control animals. The massive intracellular fat accumulation in almost all of the jejunal absorptive cells of the marmosets given the test diet is suggestive of an impaired functional capacity in these cells.

7712 RESPONSE OF TROPICAL SPRUE TO POORLY ABSORBED SULFONAMIDES AND OXYTETRACYCLINE.

(E.) Horta, E. O. (U. Puerto Rico Sch. Med., San Juan), N. Maldonado, J. Fradera, R. Santini, Jr. and E. Vélez-García. *Am. J. Clin. Nutr.* 24(11):1327-1336, 1971.

After baseline studies, 14 patients with tropical sprue received 6 months of therapy with either sulfaguanidine (2), sulfasuxidine (6) or oxytetracycline (6). All showed symptomatic improvement, increased appetite, weight gain and progressive correction of several parameters of intestinal absorption including xylose absorption and serum levels of vitamin B_{12} and folic acid, with reversal of the megaloblastic anemia (as measured by hemoglobin levels, reticulocyte index and bone marrow observations). There was significant improvement in the histological picture of the jejunum after biopsy, but the lesion was not cured.

7713 CARBOHYDRATE INTOLERANCE IN INFANTS WITH DIARRHEA. (E.) Lifshitz, F. (U. Maryland Hosp., Baltimore), P. Coello-Ramirez, G. Guitierrez-Topete and M. Cornado-Cornet. *J. Pediatr.* 79(5):760-767, 1971.

Subjects consisted of 332 infants hospitalized with severe diarrhea, dehydration, metabolic acidosis and other electrolyte abnormalities. Lactose intolerance was diagnosed in 255 on the basis of stools with a carbohydrate content of 0.25% or greater and/or a pH of less than 6.0. Recovery within 3 weeks on a milk diet occurred in 75 of 77 without lactose intolerance, in 111 of 195 with moderate lactose intolerance and in 13 of 60 with severe lactose intolerance. The intolerance to lactose was related to increasing severity of malnutrition but not to intercurrent infections, presence of enteric pathogens or prior episodes of gastroenteritis. Therapy with antibiotics increased the pH of the stool but had no effect on carbohydrate content.

7714 IgA DEFICIENCY IN CHILDREN. A CLINICAL STUDY WITH SPECIAL REFERENCE TO INTESTINAL FINDINGS. (E.) Savilahti, E. (U. Helsinki Child. Hosp.), P. Plekonen and J. K. Visakorpi. *Arch. Dis. Child.* 46(249):665-670, 1971.

In the symptomatology of 26 children with immunoglobulin A deficiency, separate disease entities were observed: autoimmune disease, malabsorption syndrome and recurrent respiratory infections. In the majority of patients, the intestinal absorptive function was normal, as studied by fecal fat and D-xylose excretion tests. Steatorrhea was found in 2 patients, and 1 of these also had low urinary D-xylose excretion. In both patients with steatorrhea and in 1 other patient, biopsy of the small intestine showed total villous atrophy. These were probably cases of celiac disease, though malabsorption symptoms were not always evident. Disaccharidase assay of biopsy specimens revealed 2 cases of isolated lactose deficiency among 8 tested. In 21 cases no immunoglobulin A was detected, while trace amounts were seen in 5. Immunoglobulin G levels were mostly in the upper normal range or somewhat high. The finding of a high incidence of celiac disease in IgA deficient children suggests that immunological mechanisms may be involved in gluten-induced small intestinal damage in celiac disease.

7715 INTESTINAL BIOPSY IN GLUTEN INTOLERANCE OF THE CHILD (100 CASES). (Fr.) Laplane, R. (Trousseau Hosp., Paris), C. Polonovski, J. L. Fontaine and J. Navarro. *Bull. Acad. Natl. Med. (Paris)* 155(7-8):141-144, 1971.

7716 WHIPPLE'S DISEASE. (Ger.) Loose, D. A. (St. Georg Gen. Hosp., Hamburg, Germany). *Chirurg* 42(7):313-316, 1971.

7717 CURRENT THOUGHTS ON COELIAC DISEASE. (E.) Burke, V. (U. Birmingham Inst. Child Health, England), M. Gracey and C. M. Anderson. *Arq. Gastroenterol. (Sao Paulo)* 8(2):67-72, 1971.

7718 THE PATTERNS OF LIPOLYTIC ENZYMES DURING ALIMENTARY LIPEMIA IN MALNUTRITION DUE TO MALABSORPTION SYNDROME IN CHILDREN. (Pol.) Szczepski, O. (Med. Acad Inst. Pediatr., Poznan, Poland), J. Socha, A. Waligora and Z. Waligora. *Pol. Tyg. Lek.* 26(20):742-745, 1971.

7719 THE SMALL BOWEL MUCOSA IN MALABSORPTION. (E.) Shiner, M. (Cent. Middlesex Hosp., London). *Arq. Gastroenterol. (Sao Paulo)* 8(1):25-34, 1971.

7720 SEVERE MALNUTRITION AND MALABSORPTION SYNDROME IN INDIVIDUALS WITH PARTIAL GASTRECTOMY FOLLOWED BY GASTROJEJUNOSTOMY. (Por.) Pfuhl Neves, D. (U. Sao Paulo Sch. Med., Brazil), A. O. Campana, S. Zaterka and A. C. Torres Da Cost *Rev. Assoc. Med. Bras.* 17(3):81-86, 1971.

7721 LONG TERM COURSE OF CELIAC DISEASE IN CHILDREN. EFFECT OF REINTRODUCING GLUTEN. (Fr.) Rey, J. (Hosp. Infant. Dis., Paris), J. Jos and F. Rey. *Ann. Med. Interne (Paris)* 122(6-7):787-790, 1971.

7722 THE INTESTINAL STASIS SYNDROME. (Dan.) Paulsen, S. (Cent. Hosp., Holstebro, Denmark) and S. H. Hansen. *Ugeskr. Laeger* 133(23):1126-1128, 1971.

See also numbers: 7954, 8043, 8064

7723 TWO CASES OF INFLAMMATORY STENOSIS OF THE RECTUM. (E.) Bertrand, P. (Lyon Hosp., France) and R. Lombard-Platet. *Am. J. Proctol.* 22(6):394-396, 1971.

Two cases of inflammatory stenosis of the rectum in which the cause was thought to be a neoplasm are presented. In each case, the tumors were considered malignant until opening of the specimen at which time they were proven to be benign. In one case the neoplasm was a voluminous rectosigmoid tumor and a Hartman procedure was performed leaving in place the distal rectum and the anus. In the other patient, a large tumor which crossed the pouch of Douglas was found to be a pseudotumoral sigmoiditis. Thus, non-cancerous stenosis of the rectum can occur, and until the cause is proven to be cancer, radical treatment which includes the loss of the sphincter should not be undertaken. In such cases, excision of the lesion with a re-establishment of continuity in one or two stages seems to be the logical treatment.

7724 SEAT BELT TRAUMA OF THE COLON. (E.) Towne, J. B. (U. Nebraska Coll. Med., Omaha) and J. D. Coe. *Am. J. Surg.* 122(5):683-685, 1971.

Characteristics of colonic injuries secondary to lap type seat belt-induced trauma were illustrated in 4 patients, and rationale for treatment outlined. Diagnosis of these injuries initially may be difficult, as classic signs of peritoneal irritation may be slow in developing. The abdomen often shows minimal initial tenderness and normal bowel sounds. Paracentesis is of great diagnostic value when positive. The seromuscular tears, which may lead to fatal perforation, and discrete colonic perforations are closed by diversion or exteriorization. In cases of colonic transection, the 2 ends should be brought out as a colostomy whenever possible. Devitalized or devascularized small intestine should be resected and primary anastomosis performed. The intestinal injuries in seat belt trauma apparently result from shearing between the abdominal wall and the spine.

7725 AGANGLIONIC MEGACOLON IN ADULTS. (E.) Briggs, H. C. (Winsted Mem. Hosp., Conn.). *Conn. Med.* 35(11):680-683, 1971.

A discussion of 2 adult patients with aganglionic megacolon is reported. In 1 patient with a diagnosis of aganglıosis, a 2-stage abdominoperineal pull-through procedure of the Swenson type was performed satisfactorily following a descending colostomy 5 weeks before. After recovery, the patient was in good condition with normal bowel movements and no fecal soiling. The second patient was diagnosed as having a persistent neuromuscular obstruction with a dilated colon and hypogangliosis, and, at the time of the report, she had undergone a colostomy as the first stage of an abdominal pull-through procedure. With both patients constipation was present and rectal biopsy revealed the underlying pathological process. These observations suggest that aganglionic megacolon may be present in the post-pediatric age group. This diagnosis should be considered after more common causes of constipation have been excluded. The diagnosis must be established by a properly performed rectal biopsy. A diverting colostomy is recommended as the first stage because of the inability to prepare the dilated colon and to facilitate the pelvic dissection at the later definitive procedure. The abdominal pull-through resection described by Swenson is applicable in adults.

7726 EFFECTS OF OPERATIVE MANIPULATION ON THE FLOW OF INTESTINAL LYMPHATICS. (E.) Akcay, F. (U. Missouri Sch. Med., Kansas City) and N. B. Ackerman. *Am. J. Surg.* 122(5):662-665, 1971.

Effects of operative techniques, which have been tried in resections of cancerous bowel to reduce the possibility of recurrence or dissemination of tumor emboli, on canine intestinal lymphatic flow were studied. Intestinal massage caused an immediate 7-fold increase in lymph flow rates, the lymph frequently becoming blood tinged. Peak levels of increased lymphatic flow (7-fold) occurred at 5 to 35 min after venous ligation. As with intestinal massage, lymph was blood tinged. If the arterial blood supply was ligated following the attainment of a stabilized increased lymphatic flow secondary to venous ligation, a gradual decrease of the elevated lymph flow levels occurred but still remained elevated as long as 100 min after arterial ligation. Immediately after complete simultaneous ligation of both arterial and venous supply, the lymphatic flow began to decrease, leveling off between 25 and 50% of control values. Following ligation of arterial blood supply alone, lymph flow rate decreased gradually to 25-50% of control values. Under no circumstances did the lymphatic flow stop completely. Operative manipulation of the colon and the cancerous lesion should be avoided until the final aspects of the operative procedure.

7727 A CASE OF ACUTE INFERIOR MESENTERIC VASCULAR OCCLUSION. (E.) Wrate, R. M. (Newcastle Gen. Hosp., Newcastle upon Tyne, England). *Br. J. Surg.* 58(8):632-635, 1971.

The patient presented with a sudden severe lower abdominal pain out of proportion to the physical signs which in the early stages was confined to the left iliac fossa, and frequent vomiting. At operation gangrenous bowel was found extending 7 cm distal from the hepatic flexure to the midpoint of the sigmoid colon, the transitional zone being clear but not abrupt. There was absence of arterial pulsation in the affected area with some free blood-stained fluid in the peritoneal cavity. The gangrenous bowel was excised, together with a normal appearing ascending colon, cecum and the distal 15 cm of the ileum, and end-to-end anastomosis of the ileum to the remaining 7 cm of the sigmoid colon was performed. The patient was treated postoperatively with i.v. fluids, potassium and ampicillin. An indwelling catheter was inserted and gastric aspirations were carried out hourly.

7728 DELAYED TENSION PNEUMOPERITONEUM AFTER COLOSTOMY CLOSURE. (E.) Hall, R. (Gen. Infirm., Leeds, England). *Br. J. Surg.* 58(8): 574-576, 1971.

In all 3 cases reported the patient showed rapidly increasing abdominal distension beginning 5, 7 and 13 days, resp., after i.p. colostomy closure indicating that the gas had leaked secondarily through the colonic suture line. The leak of gas into the peritoneum appeared to represent the passage of flatus through a weak point in the suture line during a period of incoordinated colonic mass contraction and inadequate anal relaxation. In one case anal dilatation failed to prevent this complication indicating the limited value of this procedure. In 2 cases paracentesis was successful in alleviating the problem, and in the other this procedure was not necessary.

7729 PAPILLARY ADENOMA OR VILLOUS TUMOR OF THE RECTUM AND COLON. (E.) Bacon, H. E. (Philadelphia, Pa.) and S. W. Eisenberg. *Ann. Surg.* 174(6):1002-1008, 1971.

Management of papillary adenoma of the low, mid and cephalic portion of the rectum is usually treated by local surgical excision or an abdominal pull-through procedure if necessary. Tumors located in the rectosigmoid region should be removed by rectosigmoidectomy (anterior resection). Villous tumors of the colon should be removed by segmental resection or subtotal colectomy with end-to-end anastomosis. Of 261 patients with papillary adenomas seen between 1940 and 1970, the average age was 55.4 yr with 147 cases occurring in men and 114 in women. The vast majority (196) of these tumors were located in the rectum and 162 of these were accurately described preoperatively. Of 222 tumors in the rectum and rectosigmoid, 117 (52.7%) of these were benign and 67 (30.1%) were invasive cancers. Eighteen of 39 (46.6%) of villous tumors of the colon were invasive carcinomas. In addition, 18 cases were found with either coexisting cancers elsewhere or previous malignancies. Of 52 patients with papillary adenomas of the rectum 12 (23%) disclosed regional node metastases. Surgical procedures were performed on 256 patients and only 2 deaths were recorded or a mortality of 1.5%. Of 105 patients who underwent snare removal and fulguration for benign growths of the rectum 91.6% of the patients who were able to be followed were still alive and free of cancer. Thirty patients with atypism or carcinoma in situ of the rectum showed a survival incidence of 85.7%. Of seven invasive cancer cases, 6 developed recurrences and 4 (57.1%) were reported as alive and free of cancer following resection. Five patients who underwent a Beval type of local excision were all dead whereas 82.3% of 17 patients who had local surgical excision and sutur were still alive. Further procedures such as colon resection, anterior resection of rectosigmoidectomy, admonioperineal resection or excision all showed similarly high survival rates.

7730 CURE OF AN ANAL INCONTINENCE BY PICKELL-RICHARD'S MYOPLASTY. (Fr.) Lemer and Paintaud. *Chirurgie* 97(4):283-286, 1971.

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7732 SURGICAL TREATMENT OF CARCINOMA OF THE ANAL CANAL. (Fr.) Hollender, L. F. (CHU 3rd Gen. Surg. Serv., Strasbourg, France), J. J. Kohler and P. Wong. *J. Med. Strasbourg* 2(5):471-473, 1971.

7733 TWO LONG TERM SURVIVALS AFTER RADICAL PELVIC OPERATION FOR ADVANCED CARCINOMA OF THE RECTUM. (Fr.) Rodier, D. and J. Kuntzman *J. Med. Strasbourg* 2(5):465-466, 1971.

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7747 TRAUMATIC RUPTURE OF THE APPENDIX. (Ger.) Hennicke, W. (Dist. Hosp., Stassfurt, Germany). *Zentralbl. Chir.* 96(22): 750-752, 1971.

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7753 RESULTS OF SURGICAL TREATMENT FOR CARCINOMA OF THE COLON AND RECTUM. (Pol.) Piskorz, A. (Med. Acad. Ist Surg. Clin., Poznan, Poland) and A. Kompf. *Pol. Przegl. Chir.* 43(3):475-482, 1971.

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7764 NECROTIC FORMS OF COLONIC OBSTRUCTIONS. (Fr.) Ferrario, M. G. (Timone Surg. Clin., Marseille, France). *Marseille Chir.* 23(1):1-12, 1971.

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7780 GIANT CYST OF THE SIGMOID COLON. (E.) Barratt, J. G. (Dist. Hosp., Hornsby, Australia). *Aust. Radiol.* 15(1):38-40, 1971.

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ULCERATIVE COLITIS. (Cz.) Raven, R. W. (Marsden Hosp., London). *Cas. Lek. Cesk.* 110(28-29): 684-687, 1971.

7782 CYSTIC PNEUMATOSIS OF THE COLON. WITH REFERENCE TO TWO CASES. (Fr.) Touzard, R. C. (Salpetriere Surg. Clin., Paris). *Chirurgie* 97(6):411-418, 1971.

7783 PRIMARY TUBERCULOSIS OF THE LARGE BOWEL. (A CASE REPORT). (E.) Ratnasabapathy, P. M. (Madras Med. Coll., India), R. Natanasabapathy and A. R. Balakrishnan. *Antiseptic* 68(4):298-300, 1971.

7784 THE AETIOLOGY OF APPENDICITIS. (E.) Burkitt, D. P. (MRC, London). *Br. J. Surg.* 58(9):695-699, 1971.

7785 CONTINUOUS SUCTION DRAINAGE OF THE PELVIC WOUND SPACE AFTER AMPUTATION OF THE RECTUM. (Ger.) Kiene, S. (Univ. Surg Clin., Rostocl, Germany). *Zentralbl. Chir.* 96(30): 1026-1031, 1971.

7786 SIGMOIDITIS IN ITS VARIOUS FORMS. (Fr.) Baulieux, J., P. Vuillard, J. Venouil and L. Fischer. *Cah. Med. Lyon.* 47(24):2693-2708, 1971.

See also numbers: 7210, 7482, 7483, 7484, 7494, 7495, 7587, 7623, 7654

ULCERATIVE COLITIS

7787 THE LONG-TERM RESULTS OF PARTIAL RESECTION OF THE LARGE BOWEL FOR INTESTINAL CARCINOMAS COMPLICATING ULCERATIVE COLITIS. (E.) Hultén, L. (Sahlgrens Hosp., Gothenburg, Sweden), J. Kewenter and N. G. Kock. *Scand. J. Gastroenterol.* 6(7):601-604, 1971.

Of 9 patients who had partial resection of the large intestine for intestinal carcinoma complicating ulcerative colitis, 3 subsequently developed a second carcinoma in the cecal or rectosigmoid area. Primary carcinomas were generally localized to the descending colon and rectum. In the 3 patients with a second carcinoma, the tumor was primary, and not a metastasis or local recurrence of the previous growth. The remaining 6 patients are still alive 5-20 yr after the resection for the carcinoma without any signs of recurrence or of a new primary growth. Cases of intestinal carcinoma complicating ulcerative colitis should always be managed by complete proctocolectomy and ileostomy, rather than by more limited surgery.

7788 BILE SALT, FAT, WATER, AND VITAMIN B_{12} EXCRETION AFTER ILEOSTOMY. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.) and P. Peltokallio. *Scand. J. Gastroenterol.* 6(6): 543-552, 1971.

The mean bile acid elimination was insignificantly increased in 16 patients subjected to total colectomy and ileostomy for ulcerative colitis. A positive correlation was found between effluent ileostomy discharge and both bile acid and bile salt output. Though the ileostomal fat output was slightly increased in 11 patients, the neutral sterol excretion was unchanged. Fecal fat and neutral steroids showed no correlation with each other nor with the effluent mass or the bile salts; however, a negative correlation was found between fecal fat and the Schilling test. Apart from deconjugation of bile salts, bacterial action on ileostomal acidic and neutral steroids was negligible or absent. Micellar bile salt and lipid concentration were normal in jejunal contents after a fat meal; however, the oil phase was larger in colectomized subjects, indicating some defect in the transfer of lipids from the oil to the micellar phase. Serum cholesterol was normal, and serum methyl sterols correlated with sterol balance data, indicating that augmented loss of cholesterol as bile acids was balanced sufficiently by increased cholesterol synthesis.

7789 EPIDEMIOLOGY OF ULCERATIVE COLITIS AND REGIONAL ENTEROCOLITIS (CROHN'S DISEASE) IN NORWAY. (E.) Myren, J. (Ulleval Hosp., Oslo, Norway), E. Gjone, J. N. Hertzberg, O. Rygvold, L. S. Semb and B. Fretheim. *Scand. J. Gastroenterol.* 6(6):511-514, 1971.

The incidence of ulcerative colitis and regional enterocolitis (Crohn's disease) in Norway during the period 1964-69 was studied using reports from 57 hospitals. The reported incidence of ulcerative colitis was 747 cases. Between 110 and 150 cases were reported each year without any obvious increase in the yearly rate (32.9 per million of the population per year). A total of 233 cases of regional enterocolitis was reported for the whole country, an incidence rate of 10.5 per million of the population per year. For both diseases the incidence was highest in the age group 20-29 yr, and there were slightly more men than women. The distribution of cases of Crohn's disease according to geographical areas did not closely parallel that of ulcerative colitis. The ratio of ulcerative colitis to Crohn's disease was 3.2 compared to 10.4 to 1 for the period 1956-1960.

7790 GRANULOMATOUS BOWEL (CROHN'S) DISEASE. A RETROSPECTIVE STUDY OF THE COURSE AND TREATMENT. (E.) Fromm, H. (Albany Med. Coll., N. Y.), F. A. Wilson, J. B. Rodgers, Jr. and J. A. Balint. *Arch. Intern. Med.* 128(5):739-745, 1971.

The variable nature of granulomatous bowel (Crohn's) disease and the difficulty of evaluating therapy in 92 patients was illustrated by patient summaries. Age, sex and durations of the disease did not affect the prognosis of these patients. There was also no correlation between site and extent of regional enteritis at the time of diagnosis and the incidence of major operations and mortality per 100 man yr of follow-up since time of diagnosis. The average mortality rate ranged between 1 and 2 per 100 person yr, and the average incidence of major operations was approximately 20 per 100 person yr of follow-up. Mortality was 9% of 92 patients who were followed an average of 17 yr. Mortality, operation rate, and number of complications were similar in steroid and non-steroid-treated patients when they were matched retrospectively by age, sex, site, and extent of disease. The majority of these patients underwent major operations and the risk of having further major operations was higher after the second or third operation than after the first. Patients with Crohn's disease may show remarkable improvement on supportive care, with careful attention to maintenance of nutritional, fluid, and electrolyte balance without other specific therapy.

7791 THE CLINICAL PICTURE OF ULCERATIVE COLITIS. FOLLOW UP OF 77 AMBULATORY AND HOSPITALIZED PATIENTS. (Ger.) Wagner, A. (Univ. Med. Polyclin., Heidelberg, Germany) and B. Beck. *Z. Allgemein Med.* 47(14):745-750, 1971.

7792 EMERGENCY SURGERY ON CHRONIC ULCERATIVE COLITIS. (Sp.) Gutierrez Blanco, H. (Sch. Med., Montevideo, Uruguay). *Cir. Uruguay* 40(6):543-552, 1971.

See also numbers: 7703, 7781

7793 FURTHER STUDIES ON STREPTOZOTOCIN THERAPY FOR A MULTIPLE-HORMONE-PRODUCING ISLET CELL CARCINOMA. (E.) Murray-Lyon, I. M. (King's Coll. Hosp., London), J. Cassar, R. Coulson, R. Williams, P. C. Ganguli, J. C. Edwards and K. W. Taylor. *Gut* 12(9):717-720, 1971.

A patient originally treated successfully for hypoglycemia due to an islet tumor was given 3 further infusions of streptozotocin (3 g) because of the redevelopment of marked gastric hypersecretion. Following each infusion the plasma gastrin concentration fell after 30 min, rose to twice the pre-infusion level after 80 min and gradually returned to normal. The first 2 infusions had no effect on plasma glucose or insulin levels but the third infusion caused a sharp rise in insulin. The second and third infusions caused a fall in plasma free fatty acids and a temporary rise in lactate and pyruvate. Glucose tolerance tests following the first 2 infusions showed lowered blood glucose levels while after the third infusion marked deterioration of glucose tolerance and plasma insulin response was observed. The main complication of this treatment was a severe but reversible renal tubular defect marked by severe polyuria, polydipsia, and excess renal loss of potassium. At autopsy generalized peritonitis secondary to a perforated duodenal ulcer was found. Numerous hepatic metastases and autolytic changes in the kidney were also present. High levels of gastrin and low levels of insulin and glucagon were extracted by radioimmunoassay from one of the hepatic metastases.

7794 TRACE ELEMENT BALANCES IN TWO CASES OF PANCREATIC INSUFFICIENCY. (E.) Wester, P. O. (Karolinska Inst. Hosp., Archangles, Stockholm). *Acta Med. Scand.* 190(3):155-161, 1971.

Neutron activation analysis combined with a recently developed ion exchange technique has made possible simultaneous balance studies with respect to trace elements in 2 cases of pancreatic insufficiency. The following trace elements, with and without a known biological role, were measured: Ag, As, Au, Br, Cd, Ce, Co, Cu, Fe, Hg, La, Mo, Rb, Sb, Sc, Se, Sm, W, and Zn. The patients were tested before and after enzyme substitution therapy. Patient A had a previous diagnosis of acute gastritis, gastroenteritis, and acute pancreatitis with frequent abuse of alcohol. Patient B had a cholecystectomy 9 yr previously and a total pancreaticoduodenectomy with lower 2/3 of the stomach resection 5 yr ago. During enzyme substitution patient A had a positive Cu balance, Co slightly more positive, Fe negative, Zn positive all the time. Patient B had positive Cu, Fe, and Zn balance at all times and positive Co with substitution. The Fe balance in A is consistent with reports that pancreatic secretions depress iron absorption. Patient B received less pancreatin and had no evidence of liver damage. The metabolism of trace elements is influenced by exocrine pancreatic function.

7795 INTESTINAL OBSTRUCTION ASSOCIATED WITH FIBROCYSTIC DISEASE OF THE PANCREAS. (E.) Niwayama, G. (U. California Dept. Pathol., Los Angeles) and V. V. Vadakan. *Tohoku J. Exp. Med.* 104(3):289-300, 1971.

The relationship between fibrocystic disease of the pancreas and intestinal obstruction was investigated in 41 autopsied cases of neonatal intestinal obstruction. Eighteen (44%) of the 41 cases were associated with cystic fibrosis, the obstruction being located in the preampullary duodenum (1), jejunum (4), ileum (10), or colon (3). The presence of meconium beyond the point of obstruction was noted in 32 cases, and unknown in 8 cases. Peritonitis was noted in 13 cases, 5 of which exhibited marked pancreatic parenchymal changes characteristic of fibrocystic disease of the pancreas. Pulmonary involvement in the form of pneumonia, hemorrhages or atelectasis was noted in all but 1 case. Associated congenital anomalies were present in 9 cases, including Down's syndrome (3), congenital heart diseases (5), renal anomalies (2) and others.

7796 THE EXCRETORY FUNCTION OF THE PANCREAS AFTER BILLROTH II GASTRECTOMY. (Rus.) Rusanov, A. A., V. J. Petrov. V. P. Zinevich and D. V. Fedotkin. *Vestn. Khir.* 106(6):3-6, 1971.

7797 PAROTID AND SUBMAXILLARY CALCIUM IN HUMAN CYSTIC FIBROSIS. (E.) Wotman, S. (Columbia U., New York, N. Y.), I. D. Mandel, J. Mercadante and C. R. Denning. *Arch. Oral Biol.* 16(6):663-665, 1971.

7798 CANCER OF THE BODY AND TAIL OF THE PANCREAS. (E.) Goyanes, A. D. (Mem. Cancer Ctr., New York, N. Y.), G. T. Pack and L. Bowden. *Rev. Surg.* 28(3):153-175, 1971.

7799 A RARE ASSOCIATION: COMPLETE RUPTURE OF THE PANCREAS AND OBLITERATION OF THE AORTIC CARREFOUR IN A CLOSED TRAUMA OF THE ABDOMEN. (Fr.) Morin, A., G. Spay and A. Repolt. *Rev. Med. Dijon* 6(6):411-416, 1971.

7800 LACK OF IMMUNOLOGIC REACTIVITY IN PANCREATIC CARCINOMA. (Pol.) Stypulkowski, C. (Med. Acad. Inst. Intern. Med., Cracow, Poland), J. Borysiewicz and M. Dubiel Bigaj. *Patol. Pol.* 22(2):377-405, 1971.

PANCREAS

7801 THE SURGICAL SIGNIFICANCE OF THE TOPOGRAPHY OF THE SECRETORY CANALS IN THE INTERIOR OF THE HEAD OF THE PANCREAS. (Fr.) Autissier, J. M. (Sch. Med., Dijon, France), A. Morin, B. Descotes and J. Belin. *Rev. Med. Dijon* 6(6):399-408, 1971.

7802 THERAPY OF PANCREATIC PSEUDOCYSTS. (Ger.) Hupe, K. (Univ. Surg Clin., Marburg/L., Germany) and H. Van Lessen. *Med. Klin.* 66(15):556-562, 1971.

7803 CYSTIC FIBROSIS AND NESIDIOBLASTOSIS. (E.) Brown, R. E. (Med. Coll. Virginia, Richmond) and G. E. Madge. *Arch. Pathol.* 92(1): 53-57, 1971.

7804 CARCINOID TUMOR AND CYSTADENOMA OF THE PANCREAS. (E.) Persaud, V. (U. West Indies Dept. Pathol., Kingston, Jamaica) and E. R. Walrond. *Arch. Pathol.* 92(1):28-30, 1971.

7805 SURGICAL TREATMENT OF PANCREATIC LITHIASIS. (Sp.) Restrepo, J. E. (U. Antioquia Sch. Med., Colombia). *Antioquia Med.* 21(1):13-21, 1971.

7806 ISLET CELL TUMOR OF PANCREAS IN A 7-YEAR-OLD GIRL. (Ger.) Morger, R. (Pediatr. Hosp., St. Gallen, Switzerland), J. G. Kundert and E. Werder. *Helv. Chir. Acta* 38(3): 269-271, 1971.

See also numbers: 7208, 7499, 8023, 8025

PANCREATITIS

7807 EXPERIMENTAL PANCREATITIS IN THE DOG. APPEARANCE OF COMPLEXES BETWEEN PROTEASES AND TRYPSIN INHIBITORS IN ASCITIC FLUID, LYMPH, AND PLASMA. (E.) Ohlsson, K. (Malmo Gen. Hosp., Sweden). *Scand. J. Gastroenterol.* 6(7): 645-652, 1971.

Benzoyl-DL-arginine-P-nitro-aniline hydrocholorid (BAPNA) and carboxyproprionyl-phenylalanine-p-nitroanilid (SUPHEPA) splitting α-macroglobulin complexes were demonstrated early in ascitic fluid and later in pancreatic-duodenal venous blood and lymph in dogs with experimental (closed duodenal loop) pancreatitis. These complexes were not found in the peripheral venous blood. The electrophoretic distribution of α_1-anti-trypsin did not change until late in the course of the disease, when 80-90% of the trypsin inhibitor in those specimens of ascites showing saturation of the α-macroglobulins, was abruptly converted into a slower component in the α_2-zone. The blood pressure began to fall successively resulting in death of the animal, when all the α-macroglobulins of the ascitic fluid were complexed.

7808 EXTRAHEPATIC PORTAL HYPERTENSION CAUSED BY CHRONIC PANCREATITIS. (E.) Longstreth, G. F. (Mayo Clin., Rochester, Minn.), A. D. Newcomer and P. A. Green. *Ann. Intern. Med.* 75(6):903-908, 1971.

A 21-yr study of the records of 164 Mayo Clinic patients with extrahepatic portal obstruction revealed that pancreatitis was the sole predispos disease in only five (3%). Case reports reveale that all 5 had splenomegaly and 4 of the 5 had bleeding from esophagogastric varices. Symptoma portal hypertension is not common in chronic pancreatitis, although partial or total portal system obstruction is of frequent occurrence. The possibility of extrahepatic portal hypertension and varices should be considered in chronic pancreatitis with gastrointestinal bleed and splenomegaly. Splenectomy is the method of choice if obstruction is confined to the splenic vein. A portal systemic shunt is necessary only if the portal vein is also obstructed. A patent proximal splenic vein may allow the construction of a splenorenal shunt. With widespread occlusi the only possible surgical procedure may be ligation of the varices or resection of the esophagogastric junction.

7809 PANCREATIC ENCEPHALOPATHY. (E.) Sharf, B. (Rothschild Municipal Govt. Hosp., Haifa, Israel) and E. Bental. *J. Neurol. Neurosurg. Psychiatr.* 34(3):357-361, 1971.

7810 CHRONIC PANCREATITIS CAUSING CIRCUMFE ENTIAL NARROWING OF THE DUODENUM. (E.) Brown, R. L. (Confederate Mem. Med. Ctr., Shreveport, La.) and E. K. Lang. *J. La. State Med. Soc.* 123(5):177-178, 1971.

7811 PAPILLITIS, GALLSTONES AND PANCREATITIS. (E.) D'Ambrosio, V. (Overlook Hosp., Summit, N. J.). *J. Med. Soc. NJ.* 68(6):499-502, 1971.

7812 HYPOTHERMIA OF THE STOMACH IN ACUTE PANCREATITIS. (Rus.) Shindiaikin, A. P., B. A. Petrov, E. I. Galperin and A. A. Beliaev. *Khirurgiia (Mosk.)* 47(7):85-91, 1971.

7813 OPERATIONS FOR ACUTE PANCREATITIS DUE TO OCCLUSION. (Ger.) Bunte, H. (U. Erlangen-Nuremberg Surg. Clin., Germany). *Munch. Med. Wochenschr.* 113(14):512-515, 1971.

7814 STEATONECROTIC OSTEO-ARTHROPATHY REVEALING A CALCIFYING PANCREATITIS. (Fr.) Ravault, P. P., E. Lejeune and M. Bouvier. *Rhumatologie* 23(5):171-176, 1971.

7815 ETIOLOGY AND TREATMENT OF CHRONIC PANCREATITIS. (Dut.) Pennoit, H. (Natl. U., Gent, Belgium). *Tijdschr. Geneeskd.* 27(10):445-447, 1971.

7816 HIPERLIPEMIC PANCREATITIS. (Por.) Pinotti, H. W. (U. Sao Paulo Sch. Med., Brazil), J. Fogliatto, J. Fernandes Pontes and A. Bettarello. *Arq. Gastroenterol. (Sao Paulo)* 8(1):19-24, 1971.

7817 ASEPTIC BONE NECROSIS IN TRAUMATIC PANCREATITIS. (Fin.) Parvinen, T. (Turku, Finland) and P. Vilkki. *Duodecim* 87(11):902-907, 1971.

7818 ACUTE PANCREATITIS WITH RUPTURE OF WIRSUNG'S DUCT INTO THE PERITONEAL CAVITY. (Fr.) Gillet, M. (CHU Gen. Surg. Serv., Strasbourg, France), F. Otteni and L. F. Hollender. *Chirurgie* 97(3):162-167, 1971.

7819 DIAGNOSIS OF ACUTE PANCREATITIS BY PERITONEOSCOPY. (E.) Cortesi, N. (U. Modena Dept. Surg., Italy), A. Manenti and G. C. Bruni. *Endoscopy* 3(2):108-110, 1971.

See also number: 7996

7820 PHAGOCYTIC ACTIVITY OF THE LIVER AS A MEASURE OF HEPATIC CIRCULATION - COMPARATIVE STUDY USING ^{198}Au AND ^{99m}Tc-SULFUR COLLOID. (E.) Mundschenk, H. (U. Mainz 1st Med. Clin., Germany), A. Hromec and J. Fischer. *J. Nucl. Med.* 12(11):711-718, 1971.

After simultaneous i.v. administration of the 2 nuclides, ^{198}Au-colloid was removed from the blood stream less rapidly than ^{99m}Tc-sulfur colloid. This difference can be accounted for by a greater reticuloendothelial system accumulation of ^{99m}Tc than of ^{198}Au, and this was greatest in the spleen. For both colloids, hepatic accumulation proceeded more rapidly than vascular elimination. In cirrhotic patients, the disappearance of ^{198}Au and, to a lesser extent, of ^{99m}Tc-sulfur colloid were decreased. When patients received a similar repeat dose of the nuclide within 1 hr, the constant for blood stream disappearance and hepatic uptake were the same as initially with ^{198}Au, while with sulfur colloid, the blood stream disappearance was increased and the hepatic and splenic uptake decreased. Clearance of the colloids from the blood stream was found to decrease with increasing age.

7821 CHARACTERISTICS OF ANIMALS MAINTAINED WITHOUT SPLANCHNIC PORTAL ORGANS. (E.) Price, J. B., Jr. (Columbia U. College Physicians Surg., New York, N. Y.), K. Takeshige, M. Parsa and A. B. Voorhees, Jr. *Surgery* 70(5):768-777, 1971.

Control dogs with portacaval transpositions were easily sustained with i.v. fluids, maintained normal serum electrolytes, and showed no changes in liver size upon sacrifice after 15-59 days. Slight periportal inflammation, fibrosis and cholangitis as well as a moderately elevated alkaline phosphatase were noted. Of 44 animals with eviscerated splanchnic portal organs, 27 died in less than 6 days of bleeding, respiratory problems, electrolyte imbalance, fluid overload and peritonitis. Eight eviscerated dogs that received caval blood survived 6-13 days and died of acute renal failure, oliguria and anuria. Ascites with gram-negative infections and leaks from the rectal and esophageal closures were observed. The livers of this group had doubled in size by 6 days and were normal in color and consistency but showed hepatocyte distortion and ballooning with displacement of the nuclei. Massive glycogen deposition and minimal fatty infiltration were present. By 6 days, in all animals of this group, serum bilirubin, alkaline phosphatase and SGOT were all increased. The group of eviscerated animals who received hepatic arterial blood instead of caval blood survived longer and did not die of renal failure with ascites. Hepatocyte changes and increased serum bilirubin were also present but less glycogen was present in the liver cells. Eviscerated dogs with caval blood supply that were given glucagon (100 μg/kg/day) showed a similar short survival time with renal failure and peritonitis, but their livers were normal both grossly and microscopically. Three pancreatectomized dogs with portacaval transpositions showed longer survival periods and better liver chemistries than the eviscerated groups. None died of renal failure and all showed good portal hepatocyte preservation with minimal glycogen. A tendency towards decreasing bile output was noted in the eviscerated group with caval blood supply.

7822 CLINICAL VALUE OF SERUM VITAMIN B$_{12}$ ESTIMATION IN JAUNDICE. (E.) Adams, J. F. (Southern Gen. Hosp., Glasgow, Scotland), T. Rowan, E. H. Kennedy and F. C. McEwan. *Digestion* 4(5):289-294, 1971.

In 100 jaundiced patients with hepatitis (27), obstructive jaundice (38), cirrhosis (15), cardiac jaundice (14) or miscellaneous causes (6), 152 sets of sera were further analyzed for vitamin B$_{12}$, total protein, albumin, alkaline phosphatase and SGOT on the basis of a serum bilirubin level of 1.0 mg/100 ml or greater. Vitamin B$_{12}$ levels greater than top-normal were found in 5 with hepatitis (18.5%), 6 with obstructive jaundice (15.7%), 2 with cirrhosis (13.3%) and 3 with cardiac jaundice (21.4%). Vitamin B$_{12}$ levels were significantly correlated with SGOT levels in patients with infectious hepatitis (11) and homologous serum jaundice (2) and with the serum bilirubin levels in patients with obstructive jaundice due to gallstones (4), carcinoma of the pancreas (11) and carcinoma of the biliary tract (3).

7823 DUAL-CHANNEL SCAN WITH ^{198}Au COLLOIDAL GOLD AND ^{75}Se SODIUM SELENITE FOR THE DIAGNOSIS OF NEOPLASTIC LESIONS OF THE LIVER. (E.) Meldolesi, U. (U. Milan Inst. Nucl. Med., Italy) and L. Mombelli. *J. Nucl. Biol. Med.* 15(1):30-32, 1971.

Doses of ^{75}Se sodium selenite were injected i.v. into patients in which cold areas were demonstrated by liver scan with colloidal gold, and after 24 hr a dual-channel scan was made of the ^{198}Au activity still present in the liver, and of ^{75}Se. Thus, a map was obtained with no dots where liver tissue was normal, and where lesions were located which concentrated neither radiogold nor radioselenium; therefore, an image was formed only on hepatic lesions which concentrated the selenium alone. Difficulty in recognizing neoplastic lesions close to the borders of the liver are due to the possible concentration of radioselenium in the stomach and small intestine, in the pancreas, and in the kidneys. The dual-channel technique could also be employed in cases of hepatic cirrhosis when large defects in the radiocolloid scan might be due to hepatoma, in which case the radioselenium accumulates in the area corresponding to the defect shown on the ^{198}Au map. This method may appreciably improve the diagnostic usefulness of liver scans.

7824 PLASMA ARGINASE AS A LIVER FUNCTION TEST. (E.) Cargill, C. F. (Sch. Vet. Med., Columbia, Mo.) and R. P. Shields. *J. Comp. Pathol.* 81(4):447-454, 1971.

In rats starved to 75% normal body weight, there was a slight increase in plasna arginase levels and a decrease in plasma glutamic-pyruvic transaminase. In rats receiving cortisone at 25 mg/100 g/day for 3 days, plasma levels of both enzymes were slightly elevated. In both groups, the livers showed only mild vacuolar changes in parenchymal cells. Another group of rats received CCl_4 in oil at 0.5 - 1.4 mg/kg and there was significant elevation in plasma levels of both enzymes within 36 hr. Plasma arginase levels in normal rats were 26-51 U/liter of serum, with a mean of mean 35 U/l. Levels of less than 200 U were associated with mild liver damage, and levels of more than 200 U with moderate to severe damage. Levels of glutamic-pyruvic transaminase were not related to dosage or extent of liver damage.

7825 HEPATIC ANGIOGRAPHY IN THE SELECTION OF PATIENTS WITH HEPATOMAS FOR HEPATIC LOBECTOMY. (E.) Gammill, S. L. (Tulane U. Med. Sch., New Orleans, La.), M. Takahashi, M. Kawanami, R. Font and R. Sparks. *Radiology* 101(3):549-554, 1971.

Of 16 patients subjected to liver scans and hepatic angiography 8 cases are briefly reported. Grossly, 3 types of hepatomas are described: solitary or uninodular; multinodular; diffusely infiltrative. Each type is further subdivided as to whether it is hypervascular (early) or hypo- or avascular (late, after outgrowing the blood supply). A 4-stage classification is presented on the basis of angiographic findings: I, neovascularity confined to only one lobe, or neovascularity and puddling confined to one lobe; II, neovascularity, puddling and tumor stain confined to one lobe; III, abnormal vascularity (suggesting necrosis) with or without neovascularity, puddling or tumor stain confined to one lobe; IV, any combination of neovascularity, puddling or stain in both lobes, or abnormal avascularity (necrosis) in both lobes. Patients with Stage IV hepatomas are definitely not candidates for hepatic lobectomy, and Stage III patients are only questionably candidates.

7826 HEPATIC ACID MUCOPOLYSACCHARIDES IN THE MUCOPOLYSACCHARIDOSES TYPE I, II AND III. (E.) Gordon, B. A. (Child. Psychiatr. Res. Inst., London, Ontario, Canada) and M. D. Haust. *Clin. Biochem.* 4(3):147-155, 1971.

Acid mucopolysaccharides were extracted from autopsy specimens of liver tissue from 3 patients with type I mucopolysaccharidosis (Hurler syndrome), 1 with type II (Hunter) and 2 with type III (Sanfilippo). The acid mucopolysaccharides accounted for 4-6% of the total dry weight of the liver. In type I patients there was a mixture of heparan and dermatan sulfates (heparan predominating in 2, dermatan in 1), as well as in type II (heparan dominating in both), while heparan sulfate far exceeded dermatan in the type III patients. The fractions of either substance eluted from gel filtration chromatography tended to polydisperse. The mean size of heparan was smaller than that obtained from human placental tissue, and that of dermatan was smaller than that from human umbilical cords.

7827 SERUM IMMUNOGLOBULINS AND FIVE SERUM PROTEINS IN EXTRAHEPATIC OBSTRUCTIVE JAUNDICE AND ALCOHOLIC CIRRHOSIS. IMMUNOGLOBULINS AND PROTEINS IN LIVER DISEASE. (E.) LoGrippo, G. A. (Henry Ford Hosp., Detroit, Mich.), K. Anselm and H. Hayashi. *Am. J. Gastroenterol.* 56(4):357-363, 1971.

Thirty-two patients with obstructive jaundice were compared to 28 patients with alcoholic cirrhosis to evaluate the major serum immunoglobulin (Ig) levels that reflect the response to inflammatory and non-inflammatory conditions and to evaluate the liver's ability to synthesize 5 serum proteins that reflect the functional capacity of its parenchyma. In obstructive jaundice, 25 of 32 (88%) of subjects had normal levels of IgG and IgM, while 7 (22%) had elevated levels of IgM. In cirrhosis, 23 of 28 (82%) had elevated serum IgG levels and 17 (60%) had elevated IgM levels. Serum IgA was elevated in both conditions, although it was higher in cirrhosis. In 60% and 90% of patients with obstructive jaundice and cirrhosis, resp., serum albumin levels were below normal, with the lower value occurring in patients with cirrhosis. Serum transferrin levels were above normal in patients (90%) with obstructive jaundice and below normal in patients (85%) with cirrhosis. Serum ceruloplasmin levels were elevated above the mean in 96 and 66% of the patients with jaundice and cirrhosis, resp. Complement and C-reactive protein were essentially the same in both diseases, although a greater degree of hepatic synthesis of C-reactive protein was indicated in obstructive jaundice than in cirrhosis. Immunoglobulins, albumin and transferrin, are of value in differential diagnosis but are of little help in determining the severity and prognosis of liver disease.

7828 THE MESOCAVAL SHUNT FOR PORTAL HYPERTENSION. (E.) Gliedman, M. L. (Yeshiva U. Albert Einstein Coll. Med., Bronx, N. Y.). *Am. J. Gastroenterol.* 56(4):323-333, 1971.

The use of the mesocaval shunt as a routine standard decompressive procedure was evaluated in 70 patients with portal hypertension. Postoperative splenic pulp pressures fell to the 20 mm saline level in the postoperative period and declined further later in the postshunt period. All patients demonstrating flow from the superior mesenteric vein into the vena cava on the postshunt splenoportogram remained patent and have not bled. When splenoportography showed deep opacification of the portal vein preoperatively, the outflow after surgery was demonstrated by hepatography to be predominantly through the hepatic vein. With weak or absent preoperative portal vein opacification some retrograde portal flow was occasionally demonstrated, in addition to opacification of the hepatic vein outflow. Four patients who underwent totally uneventful mesocaval shunts developed progressive derangement in liver functions, particularly bilirubin and BSP retention, resulting finally in sommolence and death. While this procedure offers theoretical advantages for the "emergency" shunt because it avoids the difficult dissection area beneath the acutely swollen liver, surgical dissection remains formidable in the acutely bleeding patient with massive portal hypertension, coagulation problems, and ascites.

7829 THERAPY FOR CARCINOMA OF THE LIVER. (E.) Bloomenthal, E. D. (Northwestern U. Med. Sch., Chicago, Ill.) and M. A. Spellberg. *Am. J. Gastroenterol.* 56(4):334-345, 1971.

The effectiveness of various therapies for carcinoma of the liver is reviewed, and the treatments utilized in 4 cases (2 with hepatocellular carcinoma, 2 with metastases from the colon) are reported. Radiotherapy prolonged the survival of patients with primary hepatoma for 8 months and relieved jaundice and weakness; however, this treatment was poorly tolerated because of nausea. Palliative resection for solitary tumor or metastasis and various types of chemotherapy was also effective in varying degrees in prolonging the patients life. Liver function tests, hepatic angiograms and liver scans were done in preparation for surgery. In the 4 cases studied, hepatic intraarterial continuous infusion of fluorodeoxyuridine (FUDR) was carried out in 3 month courses, during which time daily blood counts and urinalyses were performed. SGPT, SGOT, blood uric acid, alkaline phosphatase, and BUN were measured twice weekly. Continuous hepatic artery infusion with FUDR was effective in prolonging the lives of 3 of 4 patients with carcinomas of the liver.

7830 COMPARISON OF SERUM CLEARANCE AND URINARY EXCRETION OF MESOBILIRUBINOGEN-H^3 IN CONTROL SUBJECTS AND PATIENTS WITH LIVER DISEASE. (E.) Bernstein, R. B. (Highland Gen. Hosp., Oakland, Calif.). *Gastroenterology* 61(5):733-737, 1971.

To determine serum clearance and urinary excretion, tracer amounts of tritium-labeled urobilinogen were administered i.v. or by intraduodenal tube to patients with resolving alcoholic hepatitis (5 patients), cirrhosis and portacaval shunts (5), or extrahepatic obstruction (1), and to 6 controls with no history of hepatic or renal disease and normal function. After i.v. administration, tritiated mesobilirubinogen was rapidly cleared from the intravascular space in control patients, an average of 11% remaining after 30 min. Renal disease did not alter serum clearance; however, hepatobiliary disease caused a marked delay in serum clearance of radioactivity. At 30 min an average of 40% of the label remained. The patient with complete biliary obstruction retained a higher serum level (55%) than those with hepatic disease. While urine excretion of mesobilirubinogen -^{3}H averaged 9.9% of the dose in control patients, it was less than 1% in the uremic patient and averaged 47% in the patients with hepatobiliary disease. Following intraduodenal administration, little radioactivity appeared in the serum or urine of control patients, whereas patients with alcoholic hepatitis or with portacaval shunts had elevated serum levels and urinary excretion. Thus, the results of urine urobilinogen tests in an individual patient must take into account his intestinal, hepatic and renal function.

7831 HEPATITIS-ASSOCIATED ANTIGEN AND HEPATOCELLULAR CARCINOMA IN TAIWAN. (E.) Tong, M. J. (Los Angeles County-USC Med. Ctr., Calif.), S.-C. Sun, B. T. Schaeffer, N.-K. Chang, K.-J. Lo and R. L. Peters. *Ann. Intern. Med.* 75(5):687-691, 1971.

Hepatitis-associated antigen (HAA) was found in the serums of 44 of 55 Taiwanese patients (80%) with hepatocellular carcinoma. Thirty-nine of the 44 (88%) patients with HAA had elevations of either SGOT or SGPT; 8 of 11 (73%) of those without the antigen had increased SGOT or SGPT activity; and 28 of the 55 (51%) had hyperbilirubinemia. Alpha-fetoglobulins were found in 32 of the 55 patients (58%). While HAA was demonstrated in 138 of 943 healthy controls (14.6%), none of the 943 controls had alpha-fetoglobulins in their serums, and 25 (78%) had detectable HAA. Nineteen of 23 patients with hepatic carcinoma and negative alpha-fetoglobulins had demonstrable HAA in their serums. Thus, HAA does not seem to correlate positively with the presence of alpha-fetoglobulins in patients with hepatocellular carcinoma.

7832 HEMANGIOENDOTHELIAL SARCOMA OF THE LIVER. A CLINICOPATHOLOGICAL STUDY OF AN 81-YEAR OLD MALE VETERAN. (E.) Ansari, A. and C. E. Weigent. (Minnespolis VA Hosp., Minn.). *Am. J. Gastroenterol.* 56(5):420-427, 1971.

An 81-yr-old man was admitted because of abdominal pain and edema of legs. He had a progressively downhill course with increasing jaundice and other manifestations of liver cell failure. Terminally, he developed oliguria and died in hepatic coma; clinical diagnosis was that of hepatoma arising in a cirrhotic liver. At autopsy 3400 cc of a clear reddish brown ascitic fluid, small bilateral pleural effusions, acute pancreatitis, and esophageal varices were found. The liver was enlarged, its surface being coarsely nodular and of a mottled tan-brown and dark-red variegated appearance. Microscopic examination revealed a hemangioendothelial sarcoma, and the tumor was found growing in, and occluding, large branches of the intrahepatic portal vein, within sinusoidal spaces, and in many areas was separating and isolating liver cell cords. Hemangioendothelial sarcoma is difficult to diagnose clinically, having many points of similarity with malignant primary liver cell cancer, in its association with cirrhosis, and in its age and sex incidence.

7833 LACTIC ACIDOSIS COMPLICATING LIVER FAILURE AFTER INTRAVENOUS FRUCTOSE. (E.) Craig, G. M. (Queen Elizabeth Hosp., Birmingham, England) and C. W. Crane. *Br. Med. J.* 4(5781):211-212, 1971.

The patient was a 69-yr-old woman who presented after 4 weeks of anorexia, vomiting, and increasing jaundice, but neither liver nor spleen was palpable and there was no ascites or edema. The serum bilirubin was 29 mg/100 ml, SGOT 1800 units and SGPT 1100 units/ml, alkaline phosphatase 15 U/100 ml, and serum albumin 2.6 g and globulin 5.4 g/100 ml. The blood urea was 13 mg, creatinine 2.6 mg/100 ml, and serum Na^+ 134 mEq and K^+ 3.9 mEq/liter. After 4 days of fructose infusion she became edematous and oliguric, with a serum creatinine of 7.3 mg and blood urea of 89 mg/100 ml. A total of 80 mEq of magnesium sulfate given i.v. over 8 hr restored the serum magnesium from 0.9 to 2.0 mEq/liter. When the blood lactate result of 6.5 millimoles/liter (normal < 1.5) became available, fructose was discontinued and 5% dextrose resumed. Lactate formation resulting from fructose breakdown seems to have initiated the lactic acidosis, since this coincided with fructose therapy and improved slightly when dextrose was substituted and the serum Mg was corrected.

7834 DIAGNOSTIC VALUE OF GAMMA-GLUTAMYL TRANSPEPTIDASE AND ALKALINE PHOSPHATASE IN LIVER METASTASES. (E.) Baden, H. (Bispebjerg Hosp., Copenhagen), B. Andersen, G. Augustenborg and H. K. Hanel. *Surg. Gynecol. Obstet.* 133(5): 769-773, 1971.

Subjects consisted of 396 patients with carcinoma of the colon or rectum with no preoperative clinical evidence of hepatic involvement, and whose livers were examined for metastases during surgery for bowel tumors. Both γ-glutamyl transpeptidase and alkaline phosphatase levels were measured preoperatively in 259, alkaline phosphatase alone in 134, and transpeptidase alone in 3. None had an elevated serum bilirubin level. At surgery, hepatic metastases were found in 63 of the 396 patients. Statistically it is concluded that measurement of these 2 hepatic enzymes is of little value in the preoperative diagnosis of hepatic metastasis from carcinoma of the colon and rectum, in the absence of clinical evidence of such metastasis. This is probably due to the low prevalence of such metastases and a high number of false-positive results.

7835 RENAL FUNCTION DEFECT IN MUTANT SOUTHDOWN SHEEP WITH CONGENITAL HYPERBILIRUBINEMIA. (E.) Mia, A. S. (Kansas State U. Coll. Vet. Med., Manhattan), R. R. Gronwall, M. D. McGavin and C. E. Cornelius. *Proc. Soc. Exp. Biol. Med.* 137(4):1237-1241, 1971.

Renal clearances of inulin, para-aminohippuric acid (PAH) and endogenous urea, and some of the physicochemical properties of urine were determined in normal and mutant Southdown sheep. All of the above clearances were significantly lower for the mutant sheep, while urine flow rates during clearance studies were similar in both groups. Specific gravity and osmolarity of urine were significantly lower from Southdown mutants and were accompanied by a nearly proportionate increase in urine volume. Mutant sheep also demonstrated an increased urinary sodium excretion. Renal clearances of inulin and PAH in the adult Corriedale mutants with hyperbilirubinemia were not different from those of normal sheep, but the physicochemical properties of their urine more closely resembled those of the Southdown mutants. A marked diuresis followed p.o. water administration in normal and Corriedale mutant sheep but not in Southdown mutants. The pattern of increased daily urine volume, increased sodium excretion, and reduced urinary osmalarity and specific gravity was observed in both Southdown and Corriedale mutants and might reflect some influence of the hepatic dysfunction on kidney function in both strains.

7836 THE SERUM PORPHOBILINOGEN AND HEPATIC PORPHOBILINOGEN DEAMINASE IN NORMAL AND PORPHYRIC INDIVIDUALS. (E.) Miyagi, K., R. Cardinal, I. Bossenmaier and C. J. Watson (Northwestern Hosp., Minneapolis, Minn.). *J. Lab. Clin. Med.* 78(5):683-695, 1971.

Serum porphobilinogen concentrations in 20 normal individuals ranged from 0 to 4.4 μg% (mean 1.5), whereas in cases of acute intermittent porphyria levels ranged from 0 to 324 μg%. Aminolevulinic acid was found in higher concentrations (range 22-96 μg%) in patients with acute intermittent porphyria. In a fatal case of acute intermittent porphyria with high urinary porphobilinogen, no hepatic activity was demonstrable; however, in a case in remission but with markedly increased urine and serum porphobilinogen the dehydrogenase was about one-fourth of the nonporphyric control values. The renal clearance of porphobilinogen in these contrasting cases was essentially the same, indicating that the greater increase of serum porphobilinogen in the fatal case was related to greater production or failure of conversion to urobilinogen or both in the liver. Serum and urinary porphobilinogen values were closely correlated. Some cases in remission had huge increases, others had normal values, while in 1 case in doubtful relapse, the serum porphobilinogen was much lower than in other cases in definite remission. Serum porphobilinogen was normal in 3 of 4 cases of variegate porphyria studied.

7837 UROCANIC ACIDURIA: A DEFECT IN THE UROCANASE ACTIVITY IN THE LIVER OF A MENTALLY RETARDED [child]. (E.) Yoshida, T. (Tohoku U. Sch. Med., Sendai, Japan), K. Tada, Y. Honda and T. Arakawa. *Tohoku J. Exp. Med.* 104(4):305-312, 1971.

A new inborn error of histidine metabolism, urocanic aciduria, is described, which is characterized by mental retardation, urocanic aciduria and a defective activity of urocanase of the liver. In a 16-yr-old boy with this disorder, serum histidine levels increased markedly and remained elevated following an oral load of L-histidine. Also following L-histidine administration, large amounts of urocanic acid and considerable amounts of both imidazole pyruvic acid and imidazole propronic acid were detected in chromatograms of urine specimens. There was a marked decrease in the urocanase activity of the needle-biopsied liver specimen from the patient. No detectable amounts of formimino-glutamic acid were found in the urine after an oral dose of L-histidine, or after an i.v. injection of urocanate. Mental retardation seemed to be of early onset, although previous brain lesions may have participated in the mental retardation of the young patient.

7838 EFFECT OF ORTHOTOPIC LIVER TRANSPLANTATION ON SERUM-AUTOANTIBODIES. (E.) Smith, M. G. M. (King's Coll. Hosp., London), R. Williams, D. Doniach and R. Y. Calne. *Lancet* 2(7732): 1006-1009, 1971.

Serum antibody titers to mitochondria, smooth muscle, and nuclei were measured in 4 patients before and after orthotopic liver transplantation. In the 2 cases with primary biliary cirrhosis, and in 1 with cryptogenic cirrhosis and features of autoimmunity, the serum mitochondrial antibody titer decreased soon after operation. These antibodies reappeared 4-6 weeks after transplantation and gradually increased in titer to almost preoperative levels, except in a patient who died. The rate of reappearance of the antibodies was consistent with the half-life of circulating IgG, and in 1 patient parallel changes were observed between serum IgG, IgM and mitochondrial antibody titers. Serum antinuclear antibody present in 2 of the autoimmune cases before operation also decreased rapidly but did not show a secondary rise. Traces of smooth muscle antibody found in 2 cases preoperatively did not increase or decrease during follow-up. In these patients there was apparently an underlying abnormality of the central immune system which resulted in autoimmunization to mitochondrial and other tissue components independently of any postulated changes in hepatic antigens.

7839 CONTRACTION OF THE SPLEEN FOLLOWING NEEDLE PUNCTURE: SIGNIFICANCE IN STUDIES OF PORTAL HYPERTENSION. (E.) Dumont, A. E. (New York U. Sch. Med., N. Y.), A. Martelli and L. Birts. *Gastroenterology* 61(5):738-741, 1971.

Persistent X-ray opacification of the spleen was produced in dogs and rats by i.v. administration of powdered tantalum and the size of the spleen compared on radiographs taken before and after insertion of a needle into its pulp. A significar reduction in the size of the spleen was observed in all animals after needle puncture. The degree of contraction varied within certain limits but averaged 27% in 14 rats and 43% in 2 dogs. When splenic pulp puncture was carried out under direct vision, the capsule immediately became wrinkled and the color of the spleen changed over the course of a few sec from slate-gray to crimson. These changes commenced at the peripher of the spleen and slowly spread to include the entire organ. A normal appearance was gradually restored several min after withdrawing the needle

7840 PIG LIVER PERFUSION IN THE TREATMENT OF FULMINANT HEPATIC NECROSIS. (E.) Hickman, R. (Groote Schuur Hosp., Cape Town, South Africa), S. J. Saunders, J. B. King, G. G. Harrison and J. Terblanche. *Scand. J. Gastroente* 6(6):563-568, 1971.

Four patients were described with hepatic coma secondary to presumed viral hepatitis with massive hepatic cell necrosis, who were treated with pig liver perfusion alternating with exchan transfusion. All patients died, but 2 showed a response to the treatment, in that there was an improvement in the level of consciousness. Thre patients had normal levels of aspartate transaminase at death, reflecting the severity of necrotic damage and suggested that no further cells could be destroyed to result in elevation of this enzyme. All patients died of hemorrhagi complications; thrombocytopenia may have resulte from disseminated intravascular coagulation in the patient and from sequestration of platelets in the liver perfused with heterologous blood.

7841 ENCEPHALOPATHY AND FATTY DEGENERATION OF THE VISCERA: A CLINICOPATHOLOGIC ANALYSIS OF 40 CASES. (E.) Bourgeois, C. (U. Missouri Sch. Med., Columbia), L. Olson, D. Comer, H. Evans, N. Keschamras, R. Cotton, R. Grossman and T. Smith. *Am. J. Clin. Pathol.* 56(5):558-571, 1971.

Forty cases of encephalopathy and fatty degeneration of the viscera in Thai children were characterized by coma, convulsions, fever, respiratory distress, and vomiting in 70-75% of cases, with diarrhea in 30%. The rapid clinical course of the fatal cases was marked by inexorable progression of the above symptoms and an average duration of illness of 42 hr. Laboratory findings included: hypoglycemia, elevated free fatty acids, low cholesterol, elevated transaminases, prolonged prothrombin time, and decreased CO_2 content. Spinal fluid was clear, with decreased glucose content; there was moderate leukocytosis. Tissue lipid analyses revealed increased lipid content (both triglycerides and free fatty acids) in both liver and kidney. All of 12 liver biopsies showed diffuse small vacuole fatty metamorphosis, most prominent in the portal area. Neither necrosis nor cellular infiltration was seen. Renal involvement was not severe in the proximal tubules; cardiac changes were worse in atrial and conduction system fibers. The syndrome apparently results from acute toxic hepatitis occurring in patients with subclinical hepatic disease. Aflatoxin B_1 may be an etiologic agent in the disease in Thailand.

7842 EFFECT OF LACTULOSE ON CEREBRAL METABOLISM IN PATIENTS WITH CHRONIC PORTOSYSTEMIC ENCEPHALOPATHY. (E.) James, I. M. (Roy. Free Hosp., London) and M. Garassini. *Gut* 12(9):702-704, 1971.

The rate of cerebral oxygen and glucose consumption were studied in 6 patients with moderately severe portosystemic encephalopathy before and after a 10-day course or oral lactulose (60 ml of 50% weight/weight solution/day). Five of the 6 patients showed clinical and self-recognizable improvement. One patient with renal dysfunction as well as liver disease showed some improvement with lactulose therapy. Wide ranges in cerebral blood flow from 34 ml/100 g/min to 76 ml/100 g/min was found in these patients and lactulose did not effect a change in most instances. All patients showed increased cerebral oxygen consumption which was not accompanied by an increase in cerebral blood flow and indicated an increased arterial venous difference in oxygen content. Although there was no change in cerebral glucose consumption, an improved oxygen-glucose index was observed to increase from 49% to 80% as a result of therapy. Changes in cerebral metabolism were not accompanied by changes in arterial pCO_2 or hydrogen ion concentration. Lactulose appears to reverse at least partially the changes in cerebral metabolism in patients with hepatic encephalopathy.

7843 THE EFFECT OF HYPERTRANSFUSION ON THE GROWTH OF MOUSE FOETAL LIVER CELLS TRANSPLANTED INTO IRRADIATED, ADULT RECIPIENTS: FAILURE TO DETECT A DIFFERENTIAL EFFECT BETWEEN CELLS FROM EARLY AND LATE FOETUSES. (E.) Tarbutt, R. G. (U. Sussex Sch. Biol. Sci., Brighton, England) and R. J. Cole. *J. Cell. Physiol.* 78(2):201-207, 1971.

Male Swiss albino mice (Porton strain) or hybrids (C3H X C57BL) were irradiated with 820-850 r of ^{60}Co γ rays 1.5-2.5 hr before an i.v. injection of fetal liver or bone marrow cells. With injection of cells from fetuses at any time after the eleventh day of gestation there was resumption of erythropoiesis in the lethally-irradiated recipient mice. This transplant-induced resumption of erythropoiesis could be abolished by hypertransfusion of the recipient mice, even when transplanted cells came from fetuses at very early stages of gestation.

7844 LIVER CHANGES IN DOWN'S SYNDROME. (E.) Mori, W. (Tokyo Med. Dent. Coll.) and M. Koike. *Acta Hepatosplenol. (Stuttg.)* 18(5): 363-373, 1971.

Sixteen autopsy cases of Down's syndrome were examined for gross and histopathological liver changes. Besides mild nonspecific findings such as congestion and fatty metamorphosis of hepatic cells, no remarkable gross or histological changes were seen in any of the 8 cases not showing jaundice clinically. Almost all of the livers of the 8 jaundiced patients showed jaundiced color; some had a slightly granular surface which was consistent with their histological finding of bile stasis and fibrosis and most showed an increase in weight. Histologically, the most remarkable observation was giant-cell transformation with fibrosis which was seen in 3 cases. The same kind of alteration, but without definite formation of giant cells was noted in another case, and 2 other cases showed a mild or incomplete form of giant cell transformation but without marked hepatic cell necrosis or fibrosis. This condition was characterized by giant cell transformation of liver cells, bile thrombus formation without any signs of extrahepatic bile duct stenosis, diffuse fibrosis, inflammatory cell infiltration, hepatic cell necrosis and megakaryocyte-like cell accumulation in the hepatic sinusoids in some cases. Thus, this change was observed in more than one-third of all cases of Down's syndrome in this series.

7845 TECHNIQUE OF ORTHOTOPIC LIVER TRANSPLANTATION IN THE PIG. (E.) Chalstrey, L. J. (St. Bartholomew's Hosp., London), S. P. Parbhoo, A. Tappin, G. J. Baker, L. R. H. Gracey, P. A. Mullen and R. Lester. *Br. J. Surg.* 58(8): 585-588, 1971.

Modifications in technique included early administration of sodium bicarbonate during the operation to correct the acidosis associated with preoperative starvation. Fructose (i.v.) was given to the donor pig rather than glucose because there was evidence that the liver took it up more rapidly and in this way a glycogen-loaded graft was given to the recipient. Using pancuronium bromide, a nonpolarizing muscle relaxant of medium duration, the cardiovascular problems and postoperative apnea previously seen with other muscle relaxants were not encountered. This technique permitted the use of low concentrations of halothane, better blood collection from the donor and rapid recovery of consciousness in the recipient. Fenwall blood-collection bags were convenient and resulted in better platelet preservation. Blood collection was limited to the period just prior to the flushing of the liver to prevent blood dilution. The use of a solution of 18 mEq potassium/titer was suitable for flushing before liver perfusion but was dangerous prior to transplantation in that the high potassium concentration caused cardiac arrest when the donor liver was revascularized. Cardiac output was maintained in the short period during the completion of the portal vein anastomosis by rapid blood transfusion and digital compression of the abdominal aorta and was continued in the subsequent period when donor liver was filling with blood. These modifications have resulted in an average anesthetic time of 2 hr and 52 min with an average operating time of 2 hr and 34 min in 12 orthotopic liver transplants. All of the animals survived the operation; 6 lived for more than 24 hr and 4 lived for more than 1 week.

7846 PHENOBARBITONE ENHANCEMENT OF BROMSULPHALEIN CLEARANCE IN NEONATAL HYPERBILIRUBINEMIA. (E.) Yeung, C. Y. and V. Y. H. Yu (U. Hong Kong Queen Mary Hosp.). *Pediatrics* 48(4):556-561, 1971.

Forty full-term Chinese infants, less than 2 weeks old, with moderate jaundice (serum bilirubin of 10-20 mg/100 ml) received a humanized milk formula (Lactogen). Twenty of these received phenobarbitone syrup p.o. at 5 mg every 8 hr, the other 20 serving as controls. BSP tests and serum bilirubin measurement were performed on admission and 24 hr later. In those receiving phenobarbitone, there was a significant increase in clearance of BSP with increases in the rate constants for the hepatic uptake and biliary excretory phases.

7847 ECK'S FISTULA ENCEPHALOPATHY IN GERM-FREE DOGS. (E.) Nance, F. C. (Louisiana State U. Sch. Med., New Orleans) and D. G. Kline. *Ann. Surg.* 174(5):856-862, 1971.

End-to-side portacaval shunts were performed in 20 germ-free and 8 conventional dogs. All conventional dogs with shunts developed lethargy, 4 developing marked irritability and 2 coma. All but 1 lost a mean of 20% of their weight. All developed hyperammonemia and all had patent shunts at the time of death. There were no consistent changes in liver function tests and no prominent changes in microscopic hepatic architecture. Brain histology revealed increased numbers (mean of 8.5/350 micron field) of abnormal cerebral astrocytes. All shunted germ-free dogs appeared to lose weight and 3 became obviously cachectic. Neurologic symptoms were mild but lethargy was observed in 2. These dogs survived 9-171 days (mean 83), 4 having died and 2 having been sacrificed. All but the one that died at 9 days developed hyperammonemia. All had increased cerebral astrocyte (7.5/350 micron field) counts. Another 7 germ-free dogs became colonized with one or more strains of bacteria (3 with *Brucella*, 3 with *S. albus* and 2 with *diphtheroids*) before or after shunting, but the clinical course in these animals was similar to that in uncontaminated germ-free dogs; changes were less severe or reversed themselves in 2 of the contaminated dogs in which the shunts partially or totally closed.

7848 DYE EXCRETION STUDIES OF HEPATIC FUNCTION USING BROMSULFOPHTHALEIN AND INDOCYANIN GREEN. I: TECHNIC AND NORMAL VALUE OF THE BROMSULFOPHTHALEIN AND INDOCYANIN GREEN TESTS. INVESTIGATIONS ON LIVERS WITH INFLAMMATORY DISEASES AND FATTY LIVER. (Ger.) Seidel, R. (Reg. Hosp., Plauen, Germany), W. Holzel and G. Reissmann. *Z. Gesamte Inn. Med.* 26(13):435-441, 1971.

7849 LIVER TUMOURS IN INFANCY AND CHILDHOOD. (E.) Keeling, J. W. (Inst. Child Health, London). *J. Pathol.* 103(2):69-85, 1971.

7850 THE EFFECT OF COLLATERAL CIRCULATION ON SURVIVAL IN LIVER ISCHEMIA. (E.) Farkouh, E. F. (Roy. Victoria Hosp., Montreal, Quebec, Canada), A. M. Daniel and L. D. MacLean. *J. Surg. Res.* 11(3):130-134, 1971.

7851 FUMARIN CONTAINING AMPHOCHOLERETIC PREPARATION IN DISEASES OF THE GALLBLADDER AND THE LIVER. (Ger.) Muscher, C. H. (Wurzerstr. 11, Bad Godesberg, Germany). *Aerztl. Prax.* 23(49):2655-2656, 1971.

7852 THE BLOOD SUPPLY OF HEPATIC NEOPLASMS. (Fr.) Dargent, M. (Leon Berard Ctr., Lyon, France), J. J. Bourgoin and B. Lahneche. *Chirurgie* 97(6):355-365, 1971.

7853 BIOCHEMICAL STUDIES ON PERSISTENT CONJUGATED HYPERBILIRUBINEMIA OF THE NEWBORN. (E.) Wishahi, A. G. (Ain Shams Fac. Med., Cairo, Egypt), Y. K. W. Aboul Dahab, A. S. Khalifa and S. Hosni. *Ain Shams Med. J.* 22(2):169-177, 1971.

7854 STUDIES ON THE DARK ADAPTATION IN PATIENTS WITH CHRONIC LIVER DISEASES. DISORDERS OF THE DARK ADAPTATION IN PATIENTS WITH CHRONIC LIVER DISEASES. (Ger.) Klein, S. (Carl Gustav Carus Med. Acad., Dresden, Germany), B. Dokert, H. Dressel and F. Renger. *Dtsch. Gesundheits Wes.* 26(22):1027-1030, 1971.

7855 THE PATHOLOGICAL SHAPE VARIABILITY OF THE JUNCTIONAL COMPLEXES ALONG THE INTERCELLULAR SPACES OF THE LIVER. (E.) Pavel, I. (Nutr. Clin., Bucharest, Rumania), S. Campeanus, H. Bonaparte and A. Petrovici. *Acta Hepatosplenol. (Stuttg.)* 18(3):174-182, 1971.

7856 HYPERLIPIDEMIA, HEMOLYTIC ANEMIA AND FATTY LIVER IN A HEAVY DRINKER. ZIEVE'S SYNDROME. (Fr.) Gascard, E. (CHU Intern. Med. Serv., Marseille, France), R. Picaud and L. Galinier. *Marseille Med.* 108(5):387-392, 1971.

7857 RADIOGRAPHIC DEMONSTRATION OF LIVER ENLARGEMENT. (E.) Bonfield, R. E. (U. Michigan Dept. Radiol., Ann Arbor). *Univ. Mich. Med. Cent. J.* 37(1):36-37, 1971.

7858 RATIONALE AND CONDUCT OF VITAMIN B_{12} THERAPY IN DISEASES OF THE LIVER AND CERTAIN COBALAMIN DEFICIENCY STATES. (Rum.) Panaitescu, G. (Brincovenesc Hosp., Bucharest, Rumania), V. Fica, L. Stanescu and E. A. Popescu. *Viata Med.* 18(13):579-584, 1971.

7859 GLAZED LIVER. ANATOMICAL APPEARANCE OR DISEASE? (Fr.) Leger, L. and G. Lemaigre. *Presse Med.* 79(35):1555-1556, 1971.

7860 THE MORPHOLOGY OF SARCOIDOSIS INDUCED GRANULOMA IN LIVER BIOPSIES. (Ger.) Korb, G. (U. Marburg Pathol. Inst., Germany) and A. Werner. *Zentralbl. Allg. Pathol.* 114(3): 365-373, 1971.

7861 THE FATTY ACID PATTERN OF THE FATTY LIVER IN ALCOHOLIC AND DIABETIC SUBJECTS. (Ger.) Berg, G. (Univ. Med. Clin., Erlangen-Nuremberg, Germany), U. Troll and W. Grabner. *Med. Ernahrung* 12(5):101-102, 1971.

7862 INFANTILE POLYCYSTIC DISEASE OF THE KIDNEYS AND LIVER: CLINICAL, PATHOLOGICAL AND RADIOLOGICAL CORRELATIONS AND COMPARISON WITH CONGENITAL HEPATIC FIBROSIS. (E.) Lieberman, E. (U. Southern California Sch. Med., Los Angeles), L. Salinas Madrigal and J. L. Gwinn. *Medicine (Baltimore)* 50(4):277-318, 1971.

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7864 OSLER'S DISEASE WITH INVOLVEMENT OF THE LIVER. (HEPATIC TELANGIECTASIA). (Fr.) Bacardi, R. (Social Security Dept. Intern. Med., Barcelona, Spain), J. Guardia and J. M. Rius. *Presse Med.* 79(22):1023-1024, 1971.

7865 A COMPARATIVE STUDY OF CERTAIN SERUM GLYCOPROTEIN COMPONENTS. II. STUDY OF CHRONIC LIVER DISEASES. (Rum.) Bukaresti, L. (Inst. Pharm. Med., Tirgu Mures, Rumania), I. N. Csiki and M. Fagarasanu. *Rev. Med. (Tirgu Mures)* 17(1):37-40, 1971.

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7867 DISTURBANCES IN RATE OF SECRETION AND CHEMICAL COMPOSITION OF BILE DURING LIVER DYSTROPHY INDUCED BY CARBON TETRACHLORIDE. (Rus.) Drogovoz, S. M. (Med. Sch., Ternopol, USSR). *Vopr. Med. Khim.* 17(4):397-400, 1971.

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7870 PRIMARY OSTEOGENIC SARCOMA OF THE LIVER. REPORT OF AN AUTOPSY CASE. (E.) Sumiyoshi, A. (Kyushu U. Sch. Med., Fukuoka, Japan) and Y. Niho. *Acta Pathol. Jap.* 21(2):305-312, 1971.

7871 HEPATIC INVOLVEMENT AND JAUNDICE IN HODGKIN'S DISEASE. (Sp.) Gonzalez Cueto, D. (Ramos Mejia Hosp., Buenos Aires, Argentina) and H. Pascuccelli. *Medicina (B. Aires)* 31(4):255-266, 1971.

7872 A COMPARISON OF THE SCINTIGRAPHIC ASPECTS WITH THE OPERATIVE RESULTS IN HYDATID CYST OF THE LIVER. (Rum.) Miclutia, M. (Nucl. Med. Sect., Cluj, Rumania), T. Holan, M. Nana and V. Derevenco. *Chirurgia (Bucur.)* 20(6):517-526, 1971.

7873 RESPONSIVENESS OF HYPERPLASTIC LESIONS AND HEPATOMAS TO PARTIAL HEPATECTOMY. (E.) Kitagawa, T. (Cancer Inst., Tokyo). *Gann* 62(3):217-224, 1971.

7874 A CASE OF NIEMANN PICK'S DISEASE IN INFANCY. (Ger.) Schoenberger, W. (Univ. Pediatr. Clin., Mainz, Germany) and F. K. Kossling. *Arch. Kinderheilkd.* 183(1):51-61, 1971.

7875 SURGICAL MANAGEMENT OF COMPLICATIONS OF PORTAL HYPERTENSION: REVIEW OF THE EXPERIENCE AT THE MUSC HOSPITALS. (E.) Cathcart, R. S., III (Med. U. South Carolina, Charleston) and W. M. Rambo. *J. SC Med. Assoc.* 67(5):225-228, 1971.

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7877 SIGNIFICANCE OF FATTY LIVER IN EXPERIMENTAL ATHEROSCLEROSIS. (Jap.) Fujitsuka, M. (Univ. Sch. Med., Gifu, Japan). *Acta Sch. Med. Univ. Gifu* 18(5):558-590, 1971.

7878 X-RAY STUDY OF LIVER TUMORS IN CHILDREN (26 CASES). (Fr.) Labrune, M. (Hosp. Infant. Dis., Paris), G. Debrun and J. Lefebvre. *Arch. Fr. Pediatr.* 28(5):465-486, 1971.

7879 EXPERIENCE OF CROSS CIRCULATION AS METHOD OF HEPATIC ASSISTANCE IN SEVERE ACUTE LIVER FAILURE. (Fr.) Muller, J. M. (CHU, Grenoble, France), M. Guignier and J. Motin. *Ann. Med. Interne (Paris)* 122(5):581-587, 1971.

7880 INFLUENCE OF ETHANOL IN THE RATE OF GALACTOSE ELIMINATION IN WOMEN TAKING ORAL CONTRACEPTIVES AND IN PREGNANT WOMEN. (E.) Kesaniemi, A. (U. Helsinki 1st Dept. Obstet. Gynecol.) and K. Kurppa. *Acta Obstet. Gynecol. Scand.* 50(2):167-170, 1971.

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7882 VASCULAR TUMORS OF THE LIVER IN INFANTS AND CHILDREN. A STUDY OF 30 CASES AND REVIEW OF THE LITERATURE. (E.) Dehner, L. P. (AF Inst. Pathol., Washington, D. C.) and K. G. Ishak. *Arch. Pathol.* 92(2):101-111, 1971.

7883 SUBMICROSCOPIC CHANGES IN VARIOUS ORGANS UNDER THE INFLUENCE OF LEAD ACETATE POISONING. (E.) Grzybek, H. (Silesian Med. Acad. Dept. Histol., Zabrze Rokitnica, Poland), J. Jonek, D. Kochanska and B. Panz. *Acta Med. Pol.* 12(2):235-239, 1971.

7884 STAUFFER'S SYNDROME: REVERSIBLE HEPATIC DYSFUNCTION IN A PATIENT WITH HYPERNEPHROMA. (Fr.) Souadjian, J. V. (U. Sherbrooke Dept. Med., Quebec, Canada), J. Susset and B. Longpre. *Can. Med. Assoc. J.* 105(4): 394-396, 1971.

7885 ABDOMINAL CONTUSIONS: PERITONEAL LAVAGE AND SELECTIVE ARTERIOGRAPHY OF THE CELIAC ARTERY IN THE DIAGNOSIS OF HEPATIC AND SPLENIC LESIONS. (Fr.) Doutre, L. P. (Saint Andre Hosp., Bordeaux, France), J. Perissat and J. Tavernier. *Chirurgie* 97(6):383-386, 1971.

7886 ENLARGEMENT OF LIVER ASSOCIATED WITH INCREASED FUNCTIONAL STRESS AT VARIOUS AGES. (Ger.) Paulini, K. (U. Ulm Biol. Ctr., Germany) and G. Beneke. *Actuel. Gerontol.* 1(7): 389-395, 1971.

7887 EFFECT OF UREMIA ON DRUG DEGRADING ENZYMES IN RAT LIVER MICROSOMES. (Ger.) Leber, H. W. (Justus Liebig U. Med. Clin., Giessen, Germany), P. Streitzig, M. Kayser and G. Schutterle. *Klin. Wochenschr.* 49(16):944-946, 1971.

7888 USE OF NEUTRON ACTIVATION ANALYSIS IN DIAGNOSIS AND SUBSEQUENT CONTROL OF WILSON'S DISEASE. (Ger.) Henke, G. (Westphalian Wilhelms U., Inst. Anat., Munster, Germany), H. Mollmann and W. Althoff. *Klin. Wochenschr.* 49(5):284-286, 1971.

7889 ABNORMALITIES OF THE PHYSIOLOGY OF COPPER IN WILSON'S DISEASE. II. THE INTERNAL KINETICS OF COPPER. (E.) O'Reilly, S. (Gen. Hosp., San Francisco, Calif.), M. Pollycove, M. Tono and L. Herradora. *Arch. Neurol.* 24(6): 481-488, 1971.

7890 THE ANEURYSMS OF THE HEPATIC ARTERY. (It.) Simi, M. (U. Rome 2nd Surg. Clin.), V. Faraglia and C. Spartera. *Gazz. Int. Med. Chir.* 76(6):359-367, 1971.

See also numbers: 7244, 7340, 7453, 7479, 7481, 7488, 7489, 7490, 7491, 7504, 7506, 7508, 7510, 7518, 7521, 7523, 7524, 7526, 7703, 8066

7891 JAUNDICE DUE TO IPRINDOLE. (E.) Ajdukiewicz, A. B. (Roy. Free Hosp., London), J. Grainger, P. J. Scheuer and S. Sherlock. *Gut* 12(9):705-708, 1971.

The clinical and microscopic features in 21 patients who had hepatic reactions to iprindole treatment for depression is presented. The clinical summary of 19 cases disclosed features of liver damage related to iprindole with symptoms developed between 4 and 21 days after commencing the drug. Jaundice was noticed in 13 patients and 5 had bilirubinemia. One had pruritis which disappeared on stopping the drug and reappeared on rechallenge. Two jaundiced patients also complained of pruritis. Six complained of fever, shivering and generalized aches and pains which preceded the jaundice in 4 patients. Three patients had a rash, one had an eosinophilia. All patients recovered. Two patients studied in detail were both treated with iprindole for depression and developed hepatic reactions. Liver biopsies in 1 of these cases showed severe cholestasis, most marked at the centers of lobules, which gradually decreased after 8 weeks. No inflammation was seen but liver cell and nuclear size were increased with many binucleate cells, which were compatible with drug-induced cholestasis, and this was verified by electron microscopy. Predominant ultrastructural features were bile canaliculi dilation with osmiophilic bile pigment deposits in the lumina. Although a minority of patients have shown jaundice and hypersensitivity to this drug, there is no evidence that iprindole can lead to chronic liver damage.

7892 HEPATIC INJURY AND MULTIPLE DRUG TREATMENT. (E.) Sotaniemi, E. (U. Oulu Dept. Med., Finland), O. Hokkanen and W. J. Kaipainen. *Ann. Clin. Res.* 3(4):220-225, 1971.

The records of 55 patients with drug-induced hepatic injury were reviewed to determine which drugs were used before the onset of the illness, and whether there were any signs of drug combination as a cause of jaundice. The incidence of drug-induced hepatic damage was 1 in 310 among the patients admitted to the hospital during the observation period. Sixteen patients (29%) were taking 1 drug at the onset of the illness and 39 (71%) were taking more than 1. The highest frequency of association of a specific drug either alone or in combination was in the group of sulfonamide users (23%). The corresponding figures for the other frequently used drugs were 20% for nitrofurantoin and 20% for oral contraceptives. One of the above-mentioned drugs, or hydralazines and phenothiazenes were used alone or in combination by 85% of liver injury patients. According to laboratory tests the patients undergoing multiple therapy showed a tendency to more severe hepatic injury than those treated with a single drug. The average age and duration of stay in the hospital was higher among patients receiving several drugs.

7893 PROSPECTIVE CLINICAL EVALUATION OF BILIARY DRAINAGE IN HEPATIC TRAUMA: AN INTERIM REPORT. (E.) Lucas, C. E. (Wayne State U. Sch. Med., Detroit, Mich.). *Ann. Surg.* 174(5):830-836, 1971.

In a study of 107 patients with liver trauma, 12 had stab wounds less than 1.5 cm in diameter and not bleeding, 12 had larger stab wounds, or required suture ligation for hemostasis, or both, 44 had bullet wounds less than 3 cm in diameter, and 51 had larger bullet wounds and blunt trauma. Drainage was by standard drainage in 35, standard drainage plus cholecystostomy in 35 and standard drainage plus T-tube choledochostomy in 37. There were 13 deaths (4, 4 and 5, resp.) with no significant differences between the 3 types of drainage. There was a significantly greater morbidity in the choledochostomy group (50 complications in 20 patients) compared to those with standard drainage (19 complications in 11 patients) and the cholecystostomy group (20 complications in 12 patients). The most significant complications in the choledochostomy groups were: intra-abdominal or subphrenic abscess in 9; septic jaundice in 5; stress gastric bleeding in 6; ascending cholangitis in 4, of whom 3 had cultures positive for gram-negative organisms. There was no significant difference between the 3 types of drainage with respect to postoperative hemorrhage from the liver surface, massive wound infection or necrotizing fasciitis and respiratory insufficiency. Technical difficulties with choledochostomy included T-tube dislodgement (1), accidental cystic duct injury necessitating cholecystectomy (1), and common bile duct obstruction (1). It is concluded that controlled extrahepatic biliary drainage has no role in the management of stab wounds and smaller bullet wounds.

7894 THERAPEUTIC TRIAL WITH METHYLPHENOBARBITAL (PROMINAL), AN ENZYME INDUCER, IN LIVER DISEASE. A CONTRIBUTION TO THE QUESTION OF HEPATOTOXICITY OF BARBITURATES. (E.) Glogner, P. (Univ. Med. Polyclin., Marburg, Germany), S. Massarrat and H. R. Henrichs. *Acta Hepatosplenol. (Stuttg.)* 18(5):394-397, 1971.

The use of methylphenobarbital (200 mg/day p.o.) in the treatment of liver disease was investigated in patients with hepatic cirrhosis (7), chronic hepatitis (5) or non-diabetic fatty liver (10). The patients were divided into a placebo (control) and a therapy group, with 12 patients serving as their own controls. No significant changes in the laboratory results (BSP retention, γ-globulin, SGPT, SGOT) were observed in patients on methylphenobarbital therapy compared with the control group. Eight patients complained of side effects in the form of fatigue. One patient with chronic hepatitis showed signs of liver cell necrosis with increased transaminases and bilirubin for 4 weeks during placebo treatment, which were reversible after 3 days of methylphenobarbital therapy. The patients showed neither hepatotoxic changes nor improvement either during or after methylphenobarbital therapy.

7895 LIVER TRAUMA IN CHILDREN. (E.) Kaufman, J. M. (U. Colorado Med. Ctr., Denver) and J. D. Burrington. *J. Pediatr. Surg.* 6(5): 585-594, 1971.

Forty children with liver injury were investigated for the mechanism of injury, physical findings, associated injuries, X-ray findings, liver pathology, surgical repair, complications and mortality. Blunt trauma produced the liver injury in 37 of the 40 patients (92.5%), 22 of which occurred in automobile accidents. Associated injuries occurred in 27 of the 40 patients (67.5%), the most common being chest injuries (30%). Nineteen of the 40 patients had generalized abdominal pain and tenderness, 17 had localized right or left upper quadrant symptoms, and 2 had periumbilical pain. Radiographic examinations did not specifically indicate liver injury. On admission, 21 of the 40 patients (52.5%) were in shock (systolic blood pressure less than 80 mm Hg) and nearly one-third had hematocrits below 30%. Blood was present in the abdomen of 38 of 40 patients (95%), averaging 719 cubic cm. Twenty-eight patients (70%) sustained liver lacerations (8 minor and 20 major), 7 sustained ruptures, 3 had capsular tears and 2 had only subcapsular hematomas. The injury was repaired in 22 of the 35 survivors (63%) by simple suturing with or without drains, and with or without hemostatic gauze material. Postoperative complications included right pleural effusion or atelectasis (5), abscesses (3), and wound infections (2). Of the 5 deaths, 3 were attributable to exsanguinating liver lacerations and 2 died from brain damage.

7896 ETHANOL OXIDATION BY THE HEPATIC MICROSOMES AFTER PROLONGED ETHANOL TREATMENT. (E.) Matsumura, R. (Shinshu U. Fac. Med., Japan), E. Masamura, M. Tsukada and S. Nakanishi. *Med. J. Shinshu Univ.* 15(4):291-292, 1971.

Male Wistar rats received only ethanol for 8 months, while control rats drank water. Using washed hepatic microsomes from these animals, the kinetics of the microsomal ethanol-oxidizing enzyme was graphed with a Lineweaver-Burk plot. There was no difference in values of the apparent Michaelis constant between controls and ethanol-fed rats. There was a 50% decrease in the apparent maximal velocity in rats fed ethanol until the time of sacrifice, but not in rats fed water alone or in ethanol-fed rats deprived of ethanol and fed water for the 24 hr immediately prior to sacrifice. There was no difference between the latter 2 groups.

7897 MALIGNANCY IN NATURAL AND EXPERIMENTAL HEPATIC CYSTS: EXPERIMENTS WITH AFLATOXIN IN RATS AND THE MALIGNANT TRANSFORMATION OF CYSTS IN HUMAN LIVERS. (E.) Cruickshank, A. H. (Univ. Dept. Immunol., Liverpool, England) and S. M. Sparshott. *J. Pathol.* 104(3):185-190, 1971.

All of 12 Sprague-Dawley rats fed on Brazilian groundnut meal containing aflatoxin had hepatic tumors, some of which had spread to lymph nodes, peritoneum and lungs. All hepatic tumors contained cysts that could be differentiated microscopically into benign or poorly differentiated malignant tumors. Benign cysts formed in areas in which the hepatic cells had undergone necrosis and dissolution. Most of the tumors appeared to be carcinomas of biliary epithelial cells; secretion of mucus was often seen. However, some tumor cells contained bile pigment suggesting the possibility of parenchymal malignancy. Cystadenocarcinoma of the liver in 4 human cases was similar to the experimental tumors. Congenital cysts were associated with the cystadenocarcinomas in 2 of the human cases. The hepatic cysts produced by aflatoxin in the rat, though similar to congenital cysts, progressed to malignancy in every animal, a rarity in humans. The scarcity of human cystadenocarcinoma of the liver suggests that aflatoxin food contamination is probably not important in the etiology of primary carcinoma of the liver in man.

7898 EFFECT OF ALLOXAN DIABETES IN HEPATIC CARCINOGENESIS AND CIRRHOSIS IN A X C RATS GIVEN 2-DIACETAMIDOFLUORENE. (E.) Reuber, M. D. (U. Maryland Sch. Med., Baltimore). *Gann* 62(3):157-161, 1971.

The effect of 0.025% diacetamidofluorene on hepatic carcinogenesis and cirrhosis was studied in alloxan-treated (diabetic) male and female A x C rats. Intact male rats (11 of 13) developed a higher incidence of well-differentiated carcinom and cirrhosis of the liver than did the rats with diabetes. There were hyperplastic areas and nodules, but not carcinomas or cirrhosis, in the intact male rats with diabetes. The incidence of hepatic lesions in intact and castrated females and castrated males with diabetes was similar to that of animals without diabetes. Castrated males given alloxan did not have carcinomas and the incidence of hyperplastic lesions was lower. The hepatic lesions were virtually the same in castrated females with and without diabetes. In rats with diabetes, beta cells were decreased in the islets of Langerhans, the cecum and large intestine were markedly distended with plasma cells in the submucosa and the kidney surface was finely granular. The lack of insulin in alloxan-treated animals and the ability of insulin to increase hepatic protein synthesis may serve to protect these animals from developing carcinomas and cirrhosis.

7899 ANGIOGRAPHY IN RUPTURE OF THE LIVER. (E.) Aakhus, T. (Natl. Hosp., Oslo, Norway) and I. Enge. *Acta Radiol.* [*Diagn.*] *(Stockh.)* 11(4):353-362, 1971.

Angiography performed in 9 cases of hepatic rupture over a period of 5 yr revealed positive signs in 8 of the cases. In 4 cases there was displacement of arteries around expanding hematomas, an expected finding when bile cysts have formed. Arterial occlusion was evident in 1 case and extravasation of contrast medium from ruptured arteries in 2 cases, appearing as a large pseudoaneurysm in 1 of these patients. Delayed circulation, reflected by prolonged filling of the arteries in local areas was seen in 5 cases, probably due to hematomas and edema compressing minor vessels. An arteriovenous fistula between hepatic artery and portal vein branches was evident in 3 cases appearing as either early or retrograde filling of typical portal vein branches. Dilatation of the splenic and portal veins and increased splenic pulp pressure were evident at splenic phlebography in 1 case. Expansive processes attributable to hematomas, and displacement of the liver by i.p. fluid were seen in 3 and 4 cases, resp. The massive hemorrhage and shock that may occur often indicates immediate life saving surgery; however, preoperative angiography should be performed.

7900 ANGIOGRAPHY IN HEPATIC RUPTURE. (E.) Boijsen, E. (Univ. Hosp., Lund, Sweden), J. Kaude and U. Tylén. *Acta Radiol.* [*Diagn.*] *(Stockh.)* 11(4):363-379, 1971.

Twenty-five patients with liver damage were examined by angiography from several hr up to 150 days following blunt abdominal trauma. Extravasation of contrast medium indicating vascular lesions was the most common finding in the early posttraumatic period, usually most marked within 24 hr after trauma. Displacement of branches of the hepatic artery and portal vein surrounding an avascular lesion were characteristic findings with a hematoma lying in the parenchyma with a subcapsular hematoma (acute or late stage). A patient with combined perforating and blunt trauma had displacement of the intrahepatic arterial and portal venous branches caused by abscess formation. The most frequent type of arteriovenous shunting of contrast medium was present at the capillary level, was prominent in the early posttraumatic period and at 18 days, and seemed to occur only after a moderate contusion. The second type of shunting was observed twice and occurred directly between larger branches of the hepatic artery and the portal vein. Occlusion of the intrahepatic arterial branches and portal vein branches was observed in 4 and 2 patients, resp., in the early posttraumatic period or postoperatively. An intrahepatic artery aneurysm during the first 3 weeks after trauma was observed only once; this decreased in size by 2 months. The liver was frequently enlarged and hypervascular, particularly during the second to fourth week after the trauma. Hypervascularization was most prominent in those areas with arterioportal shunting or extravasation. Displacement of the liver indicating capsular rupture with blood in the peritoneal cavity or a subcapsular hematoma was seen in 10 patients. Repeat angiography to control healing should be performed when operation is not undertaken.

7901 STUDIES OF Y AND Z, TWO HEPATIC CYTOPLASMIC ORGANIC ANION-BINDING PROTEINS: EFFECT OF DRUGS, CHEMICALS, HORMONES, AND CHOLESTASIS. (E.) Reyes, H. (Albert Einstein Coll. Med., Bronx, N.Y.), A. J. Levi, Z. Gatmaitan and I. M. Arias. *J. Clin. Invest.* 50(11):2242-2252, 1971.

In rats receiving phenobarbital, the major hepatic cytoplasmic organic amino-binding protein Y, increased progressively to a peak after 6 days of phenobarbital and returned to normal at 9 days after drug withdrawal. Coincident with this was an increase in the initial plasma disappearance rate (K_1) and hepatic dye content of i.v.-administered BSP and indocyanine green. The effect on BSP was not altered by ligation of the common bile duct. The effect on Y, K_1, and the hepatic content of BSP were dependent on the dose of phenobarbital. With the administration of allylisopropylacetamide, dieldrin, DDT, 3-methylcholanthrene and benzpyrene, there was again an increase in these 3 parameters, and either no effect or a decrease in cytoplasmic protein fraction, Z. All parameters were reduced by cholestasis due either to biliary obstruction or administration of ethinylestradiol. Hypophysectomy and thyroidectomy increased Y, and decreased K_1 and the hepatic content of BSP. Normal rats showed no effect with thyroxine, testosterone or hydrocortisone.

7902 THE INFLUENCE OF SUBACUTE BENZENE INTOXICATION ON THE SUBMICROSCOPIC STRUCTURE OF LIVER CELLS. (E.) Jonek, J. (Silesian Med. Acad. Dept. Histol., Zabrze Rokitnica, Poland), M. Kaminski, H. Grzybek and B. Panz. *Acta Med. Pol.* 12(2):241-244, 1971.

7903 LESIONS OF THE LIVER IN CHRONIC POISONING WITH BENZENE. (Rum.) Tudose, N. (Inst. Med., Timisoara, Rumania) and C. Vilculescu. *Morfol. Norm. Patol.* 16(3):225-233, 1971.

7904 INJURY OF THE PORTAL VEIN DUE TO A TRAUMATIC CONTUSION OF THE ABDOMEN.

(Dut.) Van Hee, R. H. G. G. (St. Ignatius Hosp., Breda, Netherlands). *Acta Chir. Belg.* 70(1): 45-52, 1971.

7905 BRUCELLAR HEPATITIS WITH CASEOUS NECROSIS. (Fr.) Bastin, R. (Claude Bernard, Hosp., Paris, France), J. L. Vilde and C. Lapresle. *Lyon Med.* 225(Special Number):11-16, 1971.

7906 EFFECT OF LITHOCHOLIC ACID ON DL-ETHIONINE CARCINOGENESIS IN RAT LIVER. (E.) Hiasa, Y. (Nara Med. U., Japan), Y. Konishi, Y. Kamamoto, T. Watanabe and N. Ito. *Gann* 62(4): 239-245, 1971.

See also number: 7346

ACUTE VIRAL HEPATITIS

7907 COLLAGEN DISEASE DEBUTING AS ACUTE HEPATITIS. (E.) Sestoft, L. (Bispebjerg Hosp., Copenhagen), H. Poulsen and K. Winkler. *Scand. J. Gastroenterol.* 6(6):495-500, 1971.

Three patients in whom acute hepatitis was observed biochemically and/or histologically in the initial phase of a collagen disease are described. Liver biopsy specimens taken during the initial phase of polyarteritis nodosa in 1 patient and a disease resembling systemic lupus erythematosus (SLE) in 2 patients revealed changes typical of acute viral hepatitis. Repeated tests for Au antigen in the 2 patients with the SLE-like disease yielded positive results in 1 case. Only 1 of the 3 patients showed icteric changes. The few cases of chronic liver disease in patients with collagen disease which have been reported may have developed from acute viral hepatitis in the initial phase of the disease. The disease initiated by infection by hepatitis virus may be self-perpetuating by an autoimmune mechanism.

7908 QUANTITATION OF HEPATITIS-ASSOCIATED ANTIGEN WITH A MODIFIED OUCHTERLONY PRECIPITIN TEST. (E.) Kim, C. Y. and J. G. Tilles (U. California Orange County Med. Ctr., Orange). *J. Infect. Dis.* 124(5):512-516, 1971.

The standard Ouchterlony double-diffusion test was modified by inclusion of a 24-hr period of pretreatment of the gels with antiserum to hepatitis-associated antigen obtained from patients with hemophilia who had received multiple blood transfusions in the past. The modified technique has a standard error of less than 0.97. With the modified, but not the standard, test there was a linear relationship between the distance of a precipitin line from the antigen well and the logarithm of the antigen concentration. In the screening of 667 sera from 529 patients, the modified test was 1.6 times as effective as the standard in detecting hepatitis-associated antige In no case did the modified test give a negative result when the standard test was positive. The modified test detects antigen in a concentration one-eighth of that required for a positive result with the standard test. With the modification, sera were positive over a longer interval and in a more consistent manner.

7909 TRANSMISSION OF HUMAN HEPATITIS TO MARMOSETS: FURTHER CODED STUDIES. (E.) Holmes, A. W. (Rush-Presbyterian-St. Luke's Med. Ctr., Chicago, Ill.), L. Wolfe, F. Deinhardt and M. E. Conrad. *J. Infect. Dis.* 124(5):520-521 1971.

Coded serum or plasma specimens taken from norma patients and from patients with acute phase hepatitis were injected i.v. into marmosets in a 1:2 dilution with Hanks' balanced salt solution. Laboratory tests and histological studies were done to determine whether or not hepatitis was induced. None of the animals injected with norm human serum or plasma developed hepatitis. Hepatitis did occur in all groups of animals inoculated with proven or potentially infectious human sera or plasmas. The incubation period was similar in all groups of animals that developed hepatitis, and ranged from 30-45 days. The disease produced in colony-born marmosets was not significantly different from the hepatit in marmosets caught in the wild. Thus, the disease observed in marmosets after the inoculat of sera from humans with acute phase hepatitis seems to be caused by agents of human hepatitis, and does not represent activation of latent marmoset viruses.

7910 SERUM HEPATITIS IN SWEDISH TRACK-FINDERS. (E.) Ringertz, O. (Natl. Bacteriol. Lab., Stockholm, Sweden). *Scand. J. Infect. Dis.* Suppl. 2:1-25, 1971.

Serum hepatitis was first observed in Swedish track-finders in 1957, and the incidence had climbed to 216 per 10,000 by 1962. In 1962 hygienic conditions were improved at track-finding competitions and the competitors were offered protection against wounds and scratches which frequently resulted. During the ensuing year, only 6 cases were reported in this population. However, relaxation of some of the hygienic measures in 1964 was followed by a rise in the incidence and this again promptly decreased with reinstitution of the sanitary measures. This disease had an insidious onset after an incubation period of 90-150 days. A large number had Australia antigen in their serum, but this could not be found in sera taken more than 54 days after onset of illness. It is concluded that the serum hepatitis is spread by inoculation of contaminated blood into the scratches and wounds sustained by the competitors during the contests. The literature is also reviewed (130 references).

7911 ULTRASTRUCTURAL LOCALISATION OF ACID AND ALKALINE PHOSPHATASE ACTIVITY IN NORMAL HUMAN LIVER AND IN THE COURSE OF ACUTE HEPATITIS. (E.) Pisi, E. (U. Bologna Inst. Gen. Clin. Med., Italy), G. Cavalli and F. B. Bianchi. *Acta Hepatosplenol. (Stuttg.)* 18(5):348-354, 1971.

Acid and alkaline phosphatase activity were localized in the livers of normal subjects and patients with benign icteric hepatitis, using histochemical techniques and electron microscopy. In the normal liver the alkaline phosphatase was localized in the plasma membranes of the hepatocytes, the localization being clearly evident in about 80% of the cases in the bile capillaries, and irregular in the sinusoidal area. In acute hepatitis, alkaline phosphatase was found in the morphologically intact capillaries, while in the dilated ones with irregular or absent microvilli or with cytoplasmic "blebs" it was almost totally absent. The other portions of the plasma membranes of the liver and Kupffer cells exhibited normal behavior with the exception of the lateral surface of the cells where the enzyme reaction was almost always absent. Acid phosphatase activity was localized in the lysosomes and occasionally in the cysternae of the Golgi zone both in normal liver and in the course of acute hepatitis. The tagged lysosomes which were normally grouped in the peribiliary region, were dispersed throughout the cell and at times were close to the limiting membrane in the sinusoidal area in acute hepatitis. Thus, there seems to be a disturbance in the dynamics of bile excretion in the early stages of acute hepatitis.

7912 AUSTRALIAN ANTIGEN IN SERA AND LIVER CELLS OF CHINESE PATIENTS WITH ANICTERIC HEPATITIS. (E.) Fresh, J. W. (US Naval Med. Res. Unit 2, Taipei, Taiwan). *Trop. Geogr. Med.* 23(3):286-288, 1971.

Liver biopsies were performed on 21 Chinese Navy personnel with clinical laboratory evidence of anicteric viral hepatitis and on 10 controls with no evidence of liver disease. Using direct immunofluorescence with purified anti-Australia antigen prepared in rabbits, 13 of the 21 liver biopsies from the patients had nuclear granules which exhibited fluorescence; none of the control livers showed fluorescence. The agar-gel precipitin test was positive in 7 of those with anicteric hepatitis. The complement-fixation test for Australia antigen was positive in all 13 of those with positive liver fluorescence. None of the controls had Australia antigen in their serum.

7913 LYMPHOCYTE TRANSFORMATION AND HEPATITIS. I. IMPAIRMENT OF THYMIDINE INCORPORATION AND DNA POLYMERASE ACTIVITY. (E.) Agarwal, S. S. (Inst. Cancer Res., Philadelphia, Pa.), B. S. Blumberg, B. J. S. Gerstley, W. T. London, I. Millman, A. I. Sutnick and L. A. Loeb. *Proc. Soc. Exp. Biol. Med.* 137(4):1498-1502, 1971.

In 9 patients with viral hepatitis, DNA polymerase activity in phytohemagglutinin-stimulated lymphocytes was reduced. Values for thymidine incorporation were similarly lower in stimulated lymphocytes from all but 1 of these patients. There was no relationship between the extent of stimulation with phytohemagglutinin and the duration of symptoms or the severity of the disease. Impaired responsiveness was transient and occurred only during the acute phase of hepatitis. It is likely that the lymphocytes from patients with viral hepatitis may be hyporesponsive not only to phytohemagglutinin, but also to other antigenic stimuli. Additional studies are required to determine if the lymphocyte stimulation test could be of value in evaluating the course of hepatitis.

7914 LYMPHOCYTE TRANSFORMATION AND HEPATITIS. II. LACK OF DIRECT IN VITRO INHIBITION BY PURIFIED AUSTRALIA ANTIGEN. (E.) Millman, I. (Inst. Cancer Res., Philadelphia, Pa.), S. S. Agarwal, S. J. Bugbee, B. S. Blumberg and L. A. Loeb. *Proc. Soc. Exp. Biol. Med.* 138(1):198-203, 1971.

The effect of Australia antigen [Au(1)], plasma, frozen and thawed lymphocytes from 5 patients with viral hepatitis on the phytohemagglutinin (PHA)-stimulated lymphocytes isolated from normal patients was tested. In 4 of 5 trials plasma from patients with hepatitis had no significant effect on the PHA stimulation of normal lymphocyte DNA polymerase activity or ^{3}H-thymidine incorporation. No statistically significant effect of frozen-thawed lymphocytes from patients with hepatitis was observed on the responsiveness of normal lymphocytes to PHA. Purified Au(1) also had no significant effect on the PHA responsiveness of lymphocytes from normal individuals.

Fractions containing purified Au(1) from both cesium chloride and sucrose density gradients were also tested, and showed no significant depression of the PHA responsiveness of the lymphocytes from normal subjects. Plasma, lymphocytes and purified Au(1) do not affect the induction of DNA polymerase activity and the ability of cells to incorporate thymidine into DNA during lymphocyte transformation.

7915 HEPATITIS-ASSOCIATED ANTIGEN (HAA) IN ACUTE VIRAL HEPATITIS. SEROLOGICAL AND CLINICAL STUDIES. (E.) Iwarson, S. (U. Gothenburg Inst. Med. Microbiol., Sweden) and S. Hermodsson. *Scand. J. Infect. Dis.* 3(2):93-101, 1971.

The gel diffusion technique was used to assay for hepatitis-associated antigen in a prospective study involving 291 patients with acute viral hepatitis (including 99 i.v. amphetamine abusers). This antigen was found in 55% of hepatitis patients but in none of 68 control patients with other acute liver diseases. This incidence of antigen-positive sera ranged from 75-81% in patients with parenteral exposure and thus were presumed cases of serum hepatitis (31 hospital personnel; 99 amphetamine abusers, 12 post-transfusion cases, and 40 with professional injections). The incidence varied from 0-29% in those with presumed cases of infectious hepatitis (42 cases without known exposure, 28 hepatitis contact cases, 31 visitors to endemic areas and 8 victims of a common-source outbreak). Sera tended to become antigen-negative within a few weeks of the onset of jaundice. In those with positive sera, there were higher levels and longer persistence of total serum bilirubin and hepatic transaminases, while the thymol turbidity values and prothrombin time were decreased.

7916 INCIDENCE AND MEANING OF PERSISTENCE OF AUSTRALIA ANTIGEN IN PATIENTS WITH ACUTE VIRAL HEPATITIS: DEVELOPMENT OF CHRONIC HEPATITIS. (E.) Nielsen, J. O. (Blegdam Hosp., Copenhagen), O. Dietrichson, P. Elling and P. Christoffersen. *N. Engl. J. Med.* 285(21):1157-1160, 1971.

The incidence of the persistence of Australia antigen (AuSH) for more than 13 weeks in 253 patients with acute viral hepatitis, and the relevance of this state to the cause of the disease was investigated. AuSH was demonstrated in sera from 112 of the 253 patients (44%), occurring transitorily (1-13 weeks) in the sera of 88 of the 112 patients. In 11 patients (4.3%) AuSH was demonstrable after 13 weeks, and in all of these patients clinical and biochemical signs of chronic liver cell damage (indicative of chronic hepatitis) developed. Chronic aggressive hepatitis developed in 8 patients and chronic persistent hepatitis in 2, all 10 of which were confirmed by repeated liver biopsies. The equal distribution of patients with drug addiction among the patients with AuSH indicates that drug addiction has no major role in the progression from acute to chronic hepatitis. Thus, chronic hepatitis is likely to develop in the 4-5% of the patients with acute viral hepatitis who show a persistence of Australia antigen for several months.

7917 HEPATITIS ASSOCIATED ANTIGEN IN ACUTE VIRAL HEPATITIS IN GREECE. (E.) Papaevangelou, G. J. (U. Athens Dept. Hyg. Epidemiol.), T. Kourea and S. Tsoukas. *Pathol. Microbiol. (Basel)* 37(5):361-367, 1971.

Hepatitis-associated antigen (HAA) was detected in 94 (34.8%) of 270 cases of acute viral hepatitis in Greece. The incidence of HAA was higher (43.9%) in sera collected within 10 days after the onset of jaundice, and was lower (14.7%) later in the course of the disease. There were no significant differences with respect to age or sex. No relation was found between either severity of the disease or SGPT activity and the proportion of HAA cases. Antibody to the antigen was not detected in any of the infectious hepatitis or serum hepatitis cases. The HAA was detected in almost equal proportions in both of the above types of hepatitis. Also, they did not differ in their mean geometrical titer of HAA or in the trend of decline of their incidence in the later stages of the disease. Because of the difficulty in differentiating serum hepatitis from infectious hepatitis on clinical grounds, it seems inappropriate to insist on that distinction of viral hepatitis. Instead, the disease may be divided into 2 forms, caused by the HAA positive or negative, immunologically distinct, types of virus.

7918 HEPATITIS WITH AUSTRALIA ANTIGEN AFTER TATTOOING. (E.) Sterner, G. (Danderyd Hosp., Sweden), B.-O. Agell, P. Gerzén and R. Berg. *Scand. J. Infect. Dis.* 3(2):109-112, 1971.

Five previously healthy Swedish naval recruits were admitted (4 with jaundice, 1 with anicteric hepatitis) 9-11 weeks after all were tattooed with the same needle. Bilirubin was elevated in 4, thymol in 2, alkaline phosphatase in 4, serum transaminases in 4. Australia antigen was demonstrated in the serum of 1 patient, and remained positive at weeks 4-7 of hospitalization, returning to negative within 1 yr. Serum transaminase levels remained elevated 14 months after admission. Anti-Australia antigen antibodies could not be demonstrated in any of the 5 patients' sera.

7919 SH (AUSTRALIA) ANTIGEN IN EARLY LIFE. (E.) Turner, G. C. (Reg. Public Health Lab., Liverpool, England), A. M. Field, R. M. Lasheen, R. M. Todd, G. B. B. White and A. A. Porter. *Arch. Dis. Child.* 46(249):616-622, 1971.

A female child was born after 35 weeks gestation when its mother's serum was strongly positive for SH (Australia) antigen. At birth, however, antigen was not detectable in the infant's blood, nor in the cord blood. Tests for antigen in the child's serum were negative during the first 32 days after birth, but at 59 days they were strongly positive; 21 days later a high alanine transferase level was also noted concomitant with a sharp increase in immunoglobulin M. The child remained clinically well, with no jaundice or other signs of hepatic damage, despite a persistent elevated alanine transferase level and positive tests for antigen which remained throughout the first 2 yr of life. Strongly positive serological tests in the child correlated with electron microscopic findings that antigen particles were in the free state; no aggregates were seen in the early sera. At 45 weeks some weakening of the positive serological reaction was detected and was associated with the appearance of antigen aggregates (antigen-antibody complexes). Female infants carrying virus as a result of infection at birth may later transmit it to their own offspring. Such a sequence of events would represent the vertical transmission of hepatitis virus postulated to explain the carriage of the agent by donors lacking either a history of the disease or of blood transfusion.

7920 POSSIBLE AIRBORNE SPREAD OF SERUM-HEPATITIS VIRUS WITHIN A HAEMODIALYSIS UNIT. (E.) Almeida, J. D. (Hammersmith Hosp., London), A. E. Kulatilake, D. H. Mackay, R. Shackman, G. D. Chisholm, A. B. MacGregor, E. P. N. O'Donoghue and A. P. Waterson. *Lancet* 2(7729):849-850, 1971.

Six persons (five patients, one staff member), present in a hemodialysis unit when some blood was spilled from a patient with serum positive for Australia antigen, were also found to have serum positive for this antigen in a period of from 10-14 weeks after the incident. In light of a number of anti-contamination precautions in force prior to and at the time of this incident, it is concluded that this outbreak was caused by the airborne distribution of infected blood.

7921 SIX-YEAR SURVEY OF STAFF AND PATIENT HEPATITIS IN A RENAL TRANSPLANTATION UNIT. (E.) Collste, L. G. (Serafimer Hosp., Stockholm), R. Blomstrand and G. Magnusson. *Scand. J. Infect. Dis.* 3(2):113-119, 1971.

During the 57-month period from January 1966 to October 1970, 35 staff personnel of Serafimer Hospital developed serum hepatitis, representing 11% of the total number of exposed staff members. The greatest number of occurrences were among members of the surgical wards, postoperative departments, and clinical chemistry and transplantation laboratories. There were 3 outbreaks: January to June 1966, with 5 staff cases; January 1967 to February 1968 with 21 staff cases and 2 relatives; July 1968 to March 1970 with 9 staff cases. The spread of infection was reduced by preventative measures such as disinfection, disposable gloves, changes in laboratory routines and by a temporary moratorium on hemodialysis and renal transplantation. Prophylactic administration of gamma globulin to exposed personnel was useless.

7922 ULTRASTRUCTURAL STUDIES OF BILE DUCTULES IN THE COURSE OF ACUTE HEPATITIS. (E.) Cavalli, G. (U. Bologna Inst. Gen. Clin. Med., Italy), F. B. Bianchi, G. Bacci and A. M. Casali. *Acta Hepatosplenol. (Stuttg.)* 18(5):355-363, 1971.

The ultrastructural aspects of lobular bile ductules were studied in liver biopsies taken from 20 patients with acute viral hepatitis. In all cases the interlobular bile ducts were involved from the first days of jaundice. Biliary epithelial cells showed edema of the apical portion (blebs) and focal cytoplasmic "clarification" accompanied by infiltration of the ductular epithelium by neutrophils and lymphocytes. The involved ductules were always found in portal spaces where lymphocytes, neutrophils, plasma cells and histiocytes were evident. The observed ultrastructural changes were present in all cases with varying degrees of intensity and frequency; thus, no correlation between the intensity and frequency of the ductular alterations and the clinical picture of hepatitis was observed. Second biopsies performed in 5 patients revealed that ductular changes persisted (although less marked) even after hepatocyte lesions were no longer evident.

7923 MECHANISM OF THE PROTECTIVE ACTION OF GAMMAGLOBULIN IN INFECTIOUS HEPATITIS. (Rus.) Sokhin, A. A. and V. N. Svechkin. *Zh. Mikrobiol. Epidemiol. Immunobiol.* 48(8):63-69, 1971.

7924 AUSTRALIA ANTIGEN: LARGE SCALE PURIFICATION FROM HUMAN SERUM AND BIOCHEMICAL STUDIES OF ITS PROTEINS. (E.) Gerin, J. L. (Rockville Lab. Molec. Anat. Prog., Md.), P. V. Holland and R. H. Purcell. *J. Virol.* 7(5): 569-576, 1971.

7925 RAPID SCREENING FOR AUSTRALIA ANTIGEN USING COUNTERCURRENT ELECTROPHORESIS. (E.) Schaeffer, J. L. (U. Alabama Dept. Clin. Pathol., Birmingham) and D. M. Taft. *Am. J. Med. Technol.* 37(8):325-328, 1971.

7926 SIGNIFICANCE OF AUSTRALIA ANTIGEN IN PATIENTS AFTER KIDNEY TRANSPLANTATION. (E.) Muller, R. (Med. Sch., Hanover, Germany), K. Wonigeit and J. Bahlmann. *Klin. Wochenschr.* 49(13):768-769, 1971.

7927 AUSTRALIA ANTIGEN IN URINE. (E.) Apostolov, K. (Wellcome Res. Lab., Beckenham, England), D. J. Bauer and J. W. T. Selway. *Lancet* 1(7712):1274-1275, 1971.

7928 ENHANCED DETECTION OF AUSTRALIA ANTIGEN IN SERUM HEPATITIS PATIENTS BY DISCONTINUOUS COUNTER IMMUNOELECTROPHORESIS. (E.) Wallis, C. (Baylor Coll. Med., Houston, Tex.) and J. L. Melnick. *Appl. Microbiol.* 21(5):867-869, 1971.

7929 DETECTION OF Au SH ANTIGEN IN HOSPITAL PATIENTS WITH VIRAL HEPATITIS. (Tur.) Caglar, K. (U. Ankara Sch. Med., Turkey). *Mikrobiyol. Bult.* 5(2):132-141, 1971.

7930 CHANGES INDUCED BY HEPATITIS SERUM IN CULTURED LIVER CELLS. (E.) Brighton, W. D. (Natl. Inst. Med. Res., London), P. E. Taylor and A. J. Zuckerman. *Nature* [*New Biol.*] *(Lond.)* 232(28):57-58, 1971.

7931 FREQUENCY OF ANTIBODY TO HEPATITIS ASSOCIATED ANTIGEN AS MEASURED BY A NEW RADIOIMMUNOASSAY TECHNIQUE. (E.) Lander, J. J. (Natl. Inst. Allergy Infect. Dis., Bethesda, Md.), H. J. Alter and R. H. Purcell. *J. Immunol.* 106(5):1166-1171, 1971.

7932 VIRUS HEPATITIS AND AUSTRALIA ANTIGEN (Au HAA). PLASMA ENZYME FEATURES IN CHILDHOOD. (It.) De Pascale, A. (Camposampiero Gen. Prov. Hosp., Padua, Italy) and U. Lippi. *Acta Paediatr. Lat.* 24(1):16-28, 1971.

7933 CRITERIA FOR OUTPATIENT CARE OF FORMAL VIRAL HEPATITIS PATIENTS AND THE DUTIES OF THE DISTRICT DOCTOR IN FOLLOWING UP THESE PATIENTS. (Rum.) Lazar, A. (Marghita Territorial Hosp., Bihor, Rumania), E. Pop and V. Barbu. *Viata Med.* 18(11):521-523, 1971.

7934 VALUE OF POSITIVE ENZYME TESTS IN THE DIAGNOSIS OF INFECTIOUS HEPATITIS. (Pol.) Mierzwa, A. (M. Domanski Milit. Hosp., Tarnow, Poland). *Przegl. Lek.* 27(5):358-361, 1971.

7935 VIRAL HEPATITIS IN DRUG ADDICTS. (E.) Sullmanm S. F. (London Sch. Hyg. Trop. Med.) and A. J. Zuckerman. *Postgrad. Med. J.* 47(549):473-475, 1971.

7936 ABNORMAL HEMOSTASIS DURING SEVERE VIRUS HEPATITIS: A CLINICAL AND PATHOLOGIC STUDY. (Fr.) Guillin, M. C. (Beaujon Hosp., Clichy, France), D. Menache and J. Barge *Ann. Med. Interne (Paris)* 122(5):605-612, 1971.

7937 PHYSICAL PROPERTIES OF AUSTRALIA SH ANTIGEN. (Ger.) Schober, A. (U. Gottingen Hygiene Inst., Germany), U. Kaboth and R. Thomssen. *Arch. Gesamte Virusforsch.* 33(3-4):364-374, 1971.

7938 EPIDEMIOLOGICAL STUDY OF ANICTERIC VIRUS HEPATITIS IN A CLOSED COMMUNITY OF 495 REFUGEES. (It.) Piccinino, F. (U. Naples Infect. Dis. Clin., Italy), E. Filosa, E. Izzo and G. Pane. *Minerva Med.* 62(37):1896-1903, 1971.

7939 ISOLATION OF A HIGHLY PATHOGENIC VIRUS FROM GEESE WITH HEPATITIS. (E.) Schettler, C. H. (Ludwig Maximilians U. Inst. Dis. Domest. Wild Birds, Munich, Germany). *Avian Dis.* 15(2):323-325, 1971.

7940 STATISTICAL AND EPIDEMIOLOGICAL FINDINGS IN 273 CASES OF VIRUS HEPATITIS. (It.) Niutta, R. (S. Carlo Hosp., Potenza, Italy), M. Paterno, A. Urciuoli and G. Elifani. *Minerva Med.* 62(13):592-599, 1971.

7941 STUDIES ON ADRENAL FUNCTION IN VIRAL HEPATITIS. (Bul.) Radev, M., M. Petrova and V. Varbanov. *Suvr. Med.* 22(2):21-25, 1971.

7942 SERUM ANTIGENS IN THE DEVELOPMENT OF AUSTRALIA ANTIGEN-POSITIVE HEPATITIS. (Ger.) Muller, R. (Med. Sch., Hanover, Germany), H. W. Kreth and H. Deicher. *Dtsch. Med. Wochenschr.* 96(31):1268-1271, 1971.

7943 FOLLOW UP STUDY OF RECIPIENTS OF BLOOD FROM DONORS WITH HEPATITIS ASSOCIATED ANTIGEN (HAA) AND ANTIBODY. (Nor.) Heisto, H. (Ulleval Hosp., Oslo, Norway), A. C. Julsrud, J. C. Ulstrup and M. K. Fagerhol. *Tidsskr. Nor. Laegeforen.* 91(21-22):1530-1531, 1971.

7944 COMPLEMENT FIXATION TEST IN THE STUDY OF AUSTRALIA ANTIGEN. (E.) Dardanoni, L. (U. Palermo Inst. Hygiene, Italy), L. Pagliaro and C. Spano. *Arch. Gesamte Virusforsch* 34(1):51-63, 1971.

7945 PREPARATION AND STANDARDIZATION OF AN AUSTRALIA ANTIGEN ANTIBODY OF EQUINE ORIGIN. (E.) Cabasso, V. J. (Cutter Lab., Berkeley, Calif.), R. Nieman and D. D. Schroeder. *Appl. Microbiol.* 21(6):1017-1023, 1971.

7946 SIX CASES OF SEVERE HEPATITIS TREATED BY INTERHUMAN CROSSED CIRCULATION. (Fr.) Sicot, C. (Beaujon. Hosp., Clichy, France), J. P. Frejaville and J. Roche. *Ann. Med. Interne (Paris)* 122(3):381-387, 1971.

7947 PERSISTENCE OF 'AUSTRALIA ANTIGENEMIA' IN MENTALLY RETARDED CHILDREN SEVEN YEARS AFTER VIRUS HEPATITIS. (E.) Hayashi, H. and G. A. Logrippo. *Henry Ford Hosp. Med. J.* 19(1):27-34, 1971.

See also numbers: 7506, 7512

CHRONIC HEPATITIS

7948 PERSISTENCE OF AUSTRALIA (Au-) ANTIGEN AMONG PATIENTS IN A HOSPITAL FOR MENTALLY RETARDED AND ITS RELATION TO CHRONIC LIVER DISEASE. (E.) Nordenfelt, E. (U. Lund Dept. Med. Microbiol., M. Andrén-Sandberg, A. Lundquist and H. Henrikson. *Scand. J. Infect. Dis.* 3(2):103-107, 1971.

Serum levels of Australia antigen and anti-Australia antigen antibodies were measured in all 597 patients and all 688 personnel in a hospital for the mentally retarded. Australia antigen-positive sera were found in 36 of 442 male patients (8.1%) but in none of the female patients and in none of the personnel. Antibodies were demonstrated in 1 female patient and transiently in 1 of the personnel, neither of whom had clinical or laboratory evidence of liver disease. Of the 36 males, 33 had positive sera for 6 consecutive months. Of these 5 probably had serum hepatitis and 1 probably had infectious hepatitis. Liver biopsies were performed in 5 of 9 without clinical or laboratory evidence of liver disease, and in 17 of 24 with biochemical signs of liver injury, revealing cirrhosis in 1 (0;1), chronic aggressive hepatitis in 5 (0;5), chronic persistent hepatitis in 15 (4;11), and steatosis in 1 (1;0). Biopsies in 12 antigen-negative patients revealed no abnormalities in 9, and mild steatosis in 3.

7949 LIVER SCANNING IN SERIAL OBSERVATIONS OF PATIENTS WITH CHRONIC LIVER DISEASE. (Ger.) Nuic, M. (Med. Sch., Hanover, Germany) and P. Otto. *Dtsch. Med. Wochenschr.* 96(32):1297-1301, 1971.

7950 ASYMPTOMATIC CHRONIC HEPATITIS. (Sp.) Anonymous. *Rev. Clin. Esp.* 120(6):571-572, 1971.

7951 FUNCTIONAL CONDITION OF THE COAGULATION AND ANTICOAGULATION SYSTEM OF THE BLOOD IN CHRONIC FORM OF VIRAL HEPATITIS. (Rus.) Safonova, L. P. and R. G. Dorofeeva. *Ter. Arkh.* 43(5):70-72, 1971.

7952 OBSERVATIONS ON THE DUBIN-JOHNSON SYNDROME. (E.) Coppo, M. (U. Modena Inst. Clin. Med., Italy), M. T. Agnolucci and E. Ventura. *R. C. Rom. Gastroenterol.* 3(2):72-79, 1971.

See also number: 7916

7953 PORTAL HYPERTENSION IN PRIMARY BILIARY CIRRHOSIS. (E.) Kew, M. C. (Roy. Free Hosp., London), R. R. Varma, H. A. Dos Santos, P. J. Scheuer and S. Sherlock. *Gut* 12(10): 830-834, 1971.

The incidence and significance of portal hypertension was determined in 109 patients with primary biliary cirrhosis. Esophageal varices were demonstrated in 50 patients (47%), all of whom had an enlarged spleen and ascites. None of the other patients had both ascites and splenomegaly. Thirty-two patients had bled from esophageal varices. Twenty-seven of the patients with varices died an average of 76.7 months from the onset of symptoms of primary biliary cirrhosis and 14.9 months from the time that varices were found, half being attributable to bleeding from varices. Portacaval anastomoses performed in 11 patients improved the immediate prognosis in some patients but otherwise had little influence on the progression of the disease. Hyperplastic nodules characteristic of cirrhosis were significantly more common in the patients with varices than in the control group; however, no other histologic differences were seen between these groups. The observed regenerative nodules may be the cause of portal venous obstruction.

7954 BACTERIOLOGY OF THE SMALL INTESTINE IN CIRRHOTIC SUBJECTS AND ITS RELATION TO MALABSORPTION. (E.) Pinto Correia, J. (Univ. Hosp., Santa Maria, Lisbon, Portugal), M. Garnel, E. Monteiro, E. Areias, A. Torres Pereira and J. M. I. Campos. *Am. J. Gastroenterol.* 56(5): 428-435, 1971.

The small intestine content in 36 cirrhotic patients and its correlation to fat absorption was studied. Eighteen of 36 aspirates from small intestine were sterile or had insignificant growth. In the other 18, there was a large growth of 2, 3 or 4 different bacteria; gram-negative organisms were observed in 15 patients. Streptococcus was the most frequently observed, followed by the coliform bacilli; Candida albicans was observed in 6 patients. Definite steatorrhea was observed in 2 patients, 1 with an increase in gram-positive organisms and the other sterile. Irregular elimination of fat, with high single values was observed in 6 patients: 3 were sterile and only 1 had an increase in gram-negative bacteria. Four of 7 cases with an abnormal I^{131} triolein excretion test were sterile. There was no correlation between bacteriological growth and urinary indican, which was abnormal in 4 patients.

7955 DEVELOPMENT OF RENAL IMPAIRMENT IN LAENNEC'S CIRRHOSIS. (E.) Mullane, J. F. (Walter Reed Army Inst. Res., Washington, D. C.) and M. L. Gliedman. *Ann. Surg.* 174(6): 892-901, 1971.

The clinical course of 123 patients with Laennec's cirrhosis is analyzed. The first group consisted of 45 patients with impaired glomerular filtration rates. Twenty-nine clinically were non-ascitic and 16 were ascitic. There were only 2 instances of a normal caval pressure in the presence of decreased glomerular filtration. Cirrhotic patients had a similar fractional sodium and an increased fractional potassium excretion compared with normal controls Death occurred in 22 of the 45 patients, 9 of which died of hepatorenal failure. Eight died of liver failure and hepatic coma with upper gastrointestinal bleeding. The 9 patients who died of hepatorenal failure did not have hypotension or ascites. Similar renal abnormalities were found in 29 of the 45 patients who had no ascites. Associated with the non-ascitic patient was a decreased ability to increase the fractiona urinary sodium excretion with the decrease in glomerular filtration rate. The second group consisted of 78 cirrhotic patients who were evaluated for the relationship of serum bilirubi to the glomerular filtration rate. In the prese of ascites, there was no correlation of the endogenous creatinine clearance with the serum bilirubin. However, there was excellent correla tion of the creatinine clearance with serum bilirubin in the 59 non-ascitic patients. Below the serum bilirubin level of 4.0 mg/100 ml, no correlation was observed with creatinine clearan Ascites and hyperbilirubinemia does not seem to cause the renal dysfunction associated with this form of cirrhosis.

7956 REGIONAL LUNG FUNCTION IN PATIENTS WITH HEPATIC CIRRHOSIS. (E.) Ruff, F (Necker Fac. Dept. Physiol., Paris), J. M. B. Hughes, N. Stanley, D. McCarthy, R. Greene, A. Aronoff, L. Clayton and J. Milic-Emili. *J. Clin Invest.* 50(11):2403-2413, 1971.

In 10 patients with several types of hepatic cirrhosis, it was shown with ^{135}Xe that this disease may be accompanied by maldistribution of pulmonary blood flow and, especially, of ventil tion which may cause marked impairment of gas exchange within the lungs. In all 10 there was an increase above normal of the closing volume, which is the lung volume at which the pulmonary bases begin to trap air secondary to airway closure. In eight the closing volume was great than the functional residual capacity, indicati that during resting tidal volume breathing ther was airway closure and gas trapping. With decreased ventilation due to airway closure, the ventilation/perfusion ratio was decreased. It is suggested that this airway closure may resul from compression of minor airways by dilated blood vessels and/or interstitial pulmonary edema.

7957 THE ROLE OF MAST CELLS IN HUMAN LIVER CIRRHOSIS. (E.) Kim, U. (Nagoya U. Sch. Med., Japan). *Nagoya J. Med. Sci.* 34(2): 131-142, 1971.

At autopsy, liver specimens were removed from 55 cases with cirrhosis and 5 with chronic hepatitis. Specimens from cirrhotic livers were classified (according to Kim) as postnecrotic (A and B phase of type I, with 7 and 14 cases, respectively) post-hepatitic (A and B phase of type II, with 8 and 20 cases, respectively) and nutritional (type III, 6 cases). The mean number of mast cells/mm^3 whole liver in these 5 groups and in the cases of chronic hepatitis were 289, 587, 628, 334, 174 and 56, resp., while the mean number of mast cells/mm^3 of trabeculae were 587, 1,580, 3110, 1507, 530 and 747, resp. The mean liver weight in these groups was 901, 1026, 1383, 1021, 1710 and 1100 g, resp. There was a significant increase in the number of mast cells in the type I-B and type II-B livers and this was correlated with the increased liver weight in these patients. There was no correlation between relative volume of trabeculae and the number of mast cells/mm^3 of whole liver or of trabeculae.

7958 RATES OF ETHANOL CLEARANCE AND ACTIVITIES OF THE ETHANOL-OXIDIZING ENZYMES IN CHRONIC ALCOHOLIC PATIENTS. (E.) Mezey, E. (Baltimore City Hosps., Md.) and F. Tobon. *Gastroenterology* 61(5):707-715, 1971.

Ethanol was administered to 25 chronic alcoholics and the rates of disappearance of ethanol from the blood and the activities of the ethanol-oxidizing enzymes were determined during ingestion and following withdrawal, to assess whether changes in the rates were accompanied by parallel changes in the activity of the enzymes. The mean rate of ethanol disappearance from the serum of these patients was significantly higher than in the controls. The mean activity of the NADPH-dependent ethanol-oxidizing enzyme system was also increased in these patients; however, there was no significant difference in alcohol dehydrogenase activity. No correlation was found between the rates of ethanol disappearance from the serum and the activities of either the NADPH-dependent ethanol-oxidizing enzymes system or alcohol dehydrogenase. Follow-up liver biopsies in 12 patients after varying intervals of withdrawal from alcohol revealed decreases in the degree of fatty infiltration in all cases. The mean rate of ethanol disappearance from the serum decreased to normal as early as 7 days after withdrawal from alcohol, while the mean NADPH-dependent ethanol-oxidizing activity was decreased significantly only after 21 days. Alcohol dehydrogenase, however, increased significantly at 7 days, returning to normal 21 days after withdrawal from alcohol.

7959 AN ULTRASTRUCTURAL STUDY OF THE LIVER IN INDIAN CHILDHOOD CIRRHOSIS WITH PARTICULAR REFERENCE TO THE STRUCTURE OF CYTOPLASMIC HYALINE. (E.) Roy, S. (All-India Inst. Med. Sci., New Delhi), V. Ramalingaswami and N. C. Nayak. *Gut* 12(9):693-701, 1971.

In 8 cases of cirrhosis studied in Indian children, there was extensive, severe cytoplasmic damage in the hepatocytes with marked mesenchymal reaction and creeping fibrosis as well as the presence of irregular masses, tangles and threads of brightly eosinophilic hyaline material in the perinuclear zone. These changes were verified with the electron microscope. The electron dense hyaline showed no limiting membrane and seemed to merge with the adjacent cytoplasm and rough endoplasmic reticulum. The hyaline masses were composed of fibrillary material of 80-130 angstrom in diameter, mixed with fine, moderately electron-dense granules. These granules consisted of glycogen-like particles of 400-500 angstrom as well as smaller ribosomal particles of 150 angstrom. The hepatocytes appeared pale with large electron-lucent areas in the cytoplasm and sparse, loosely arranged cytoplasmic organelles. Some cells showed irregular, marked dilatation of the cisterns of rough endoplasmic reticulum. Mitochondria in degenerating hepatocytes were fuzzy with no clear membrane and crystal definition, and did not appear to participate in the formation of hyaline. In addition, many variable cytoplasmic membrane-bound dense bodies were found in areas of the cytoplasm undergoing degeneration and were considered to be cytolysomes resulting from focal cytoplasmic degeneration. Nuclei of hepatocytes were paler and less electron-dense than normal hepatocyte nuclei and hepatocyte microvilli at the sinusoidal border were shortened or absent in many cases. The hyaline found in these cases appears identical to the alcoholic hyaline of Biava and Smuckler and is a product of, or derived from, endoplasmic reticulum rather than mitochondria.

7960 THE CONGENITAL MEMBRANOUS OCCLUSION OF THE INFERIOR VENA CAVA. A CASE REPORT WITH HEPATIC CIRRHOSIS TREATED BY SURGERY. (Fr.) Michaud, P. (Cardio-Vasc. Hosp., Lyon, France), H. Termet and J. Chassignolle. *Lyon Chir.* 67(1): 3-9, 1971.

7961 CONGESTIVE HEART FAILURE AND JAUNDICE FOLLOWING REPLACEMENT OF CARDIAC VALVES. (E.) Anonymous. *Am. J. Med.* 50(6):797-808, 1971.

7962 LIVER CIRRHOSIS IN JAPANESE. (Jap.) Shikata, T. (U. Tokyo Sch. Med.). *Naika* 27(3):505-506, 1971.

7963 AUSTRALIA ANTIGEN IN THE DIAGNOSIS OF THE ICTERIC SYNDROME. (Sp.) Guardia, J. (Social Security Sanitar., Barcelona, Spain), J. M. Martinez Vazquez, R. Bacardi and A. Ferragut. *Med. Clin. (Barc.)* 56(4):481-486, 1971.

CIRRHOSIS

7964 THE CLINICAL AND BIOLOGICAL SIGNIFICANCE OF GLUCOSE METABOLISM IN ERYTHROCYTES. I. THE ACTIVITY OF ENZYMATIC SYSTEMS IN MYOCARDIAL INFARCTION AND IN LIVER CIRRHOSIS. (E.) Bechtel, P. (CHU Dept. Pharmacol., Besancon, France), Y. Bechtel and P. Magnin. *Res. Commun. Chem. Pathol. Pharmacol.* 2(3):302-314, 1971.

7965 UNUSUAL SPLENOPORTOGRAPHIC APPEARANCE IN CIRRHOSIS. (Fr.) Klepping, C. (Gen. Hosp., Dijon, France), F. Martin, J. P. Mabille and J. Villand. *Presse Med.* 79(16):718, 1971.

7966 METABOLIC AND FUNCTIONAL CONSEQUENCES OF PORTACAVAL ANASTOMOSIS IN LIVER CIRRHOSIS. (Fr.) Leger, L. and J. P. Lenriot. *Presse Med.* 79(16):699-700, 1971.

7967 THE LIVER AND SPLEEN IN CIRRHOTIC PATIENTS AFTER PORTACAVAL ANASTOMOSIS. (Fr.) Leger, L. (Cochin Hosp., Paris, France), G. Lemaigre and J. P. Lenriot. *Presse Med.* 79(16):701-706, 1971.

7968 STUDIES ON WATER AND ELECTROLYTE METABOLISM IN CIRRHOSIS OF THE LIVER. EFFECTS OF TREATMENT WITH SPIRONOLACTONE. (It.) D'Angelo, A. (U. Padua Inst. Spec. Med. Pathol., Italy), G. Mioni and E. Ossi. *Progr. Med. (Roma)* 27(1):10-14, 1971.

7969 IMPAIRED CARBOHYDRATE UTILIZATION IN HEPATIC CIRRHOSIS. (Sl.) Dzurikova, V. (Res. Lab. Paarm. Biochem, Bratislava), E. Brixova and T. R. Niederland. *Cas. Lek. Cesk.* 110(30):702-707, 1971.

7970 ALPHA 1 ANTITRYPSIN DEFICIENCY. (E.) Sharp, H. L. (U. Minnesota Health Sci. Ctr., Minneapolis). *Hosp. Pract.* 6(5):83-87, 1971.

See also numbers: 7239, 7706, 7827, 8065

GALLBLADDER AND BILIARY TRACT DISEASES

7971 RELATIONSHIP OF BILE ACID POOL SIZE TO BILIARY LIPID EXCRETION AND THE FORMATION OF LITHOGENIC BILE IN MAN. (E.) Swell, L. (VA Hosp., Richmond, Va.), C. C. Bell, Jr. and Z. R. Vlahcevic. *Gastroenterology* 61(5):716-722, 1971.

The total bile acid pool and biliary lipid composition was determined in 10 patients with and 10 patients without gallstones in an attempt to correlate the excretion of biliary lipids with gallstone formation. Patients with gallstones had significantly smaller cholic and total bile acid pools and a higher percentage of biliary cholesterol than patients without gallstones. Patients with gallstones excreted much smaller amounts of biliary phospholipid (40% decrease) and cholesterol (17% decrease) than patients without gallstones. Regression analysis revealed a high degree of correlation between phospholipid excretion and bile acid pool size, and between bile acid pool size and cholesterol excretion. Bile acid pool size was a more important determinant of phospholipid excretion than cholesterol excretion, and cholesterol excretion was more independent of bile acid pool size than phospholipid excretion. Patients with gallstones appear to have a relative decrease in bile salts and phospholipid in relation to cholesterol and a bile saturated with cholesterol as a result of the decreased bile acid pool and phospholipid excretion.

7972 PRIMARY SARCOMA OF THE GALLBLADDER. REPORT OF THREE CASES. (E.) Yasuma, T. (Juntendo U. Sch. Med., Tokyo) and M. Yanaka. *Acta Pathol. Jap.* 21(2):285-304, 1971.

Three cases are briefly presented and the literature is reviewed (44 references). A rapid (2-3 weeks) downhill course was seen in the case of a 74-yr-old male with severe generalized jaundice who at autopsy was found to have a leiomyosarcoma of the gallbladder with continuous infiltration into the liver, protrusion into the common bile duct through the cystic duct and involvement of hepatic hilar and peripancreatic nodes, obstructi jaundice with cholangitic abscesses and acute hemorrhagic gangrenous duodenitis. An even more rapid downhill course was seen in a 66-yr-old woman with suspected rhabdomyosarcoma of the gallbladder. This patient had continuous infiltr tion to the liver and duodenal wall, involvement of hepatic hilar peripancreatic and left supraclavicular nodes, jaundice with cholangitic abscesses, esophageal varices, almost 2 liters o yellowish ascites, bronchopneumonia, and chronic thyroiditis. The gallbladder contained 30 small cholesterol stones. Reticulum cell sarcoma of the gallbladder was the diagnosis by surgical pathology at laparotomy in a 29-yr-old male who also died quickly, but on whom autopsy was not permitted.

7973 STUDIES CONCERNING THE PATHOGENESIS OF NEUROGENIC HYPERCHOLESTEROLEMIA. I. INDEPENDENCE OF HYPERCHOLESTEROLEMIA AND BILIARY EXCRETION. (E.) Friedman, M. (Mt. Zion Hosp., San Francisco, Calif.) and S. O. Byers. *Proc. Soc. Exp. Biol. Med.* 138(1):258-261, 1971.

The possible role of biliary obstruction in the pathogenesis of neurogenic hypercholesterolemia was investigated in rats with and without bilateral hypothalamic lesions. Both the biliary system and hepatic parenchymal cells of rats killed 3 weeks after the induction of bilateral hypothalamic lesions (mean plasma cholesterol during the 3 weeks was 116 mg/100 ml) appeared identical to those in the control rats. The average bile flow in rats 4 weeks after hypothalamic injury was essentially the same as that observed in controls; however, the average cholesterol concentration of the bile (12.0 mg/100 ml) of the experimental group was significantly less than that found in the bile of controls (16.3 mg/100 ml). The insertion of polyethylene tubing into the bile duct did not prevent the occurrence of hypercholesterolemia observed after the induction of hypothalamic injury. Hypothalamic injury evoked its own specific hypercholesterolemic response even in rats subjected to total biliary obstruction. Thus, hypercholesterolemia induced by bilateral hypothalamic lesions is not mediated by an abnormality in bile flow.

7974 ACALCULOUS CHOLECYSTITIS IN BURNED PATIENTS. (E.) Munster, A. M. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.), M. N. Goodwin and B. A. Pruitt, Jr. *Am. J. Surg.* 122(5):591-593, 1971.

Of 2,456 burned patients treated from 1961 to 1970, 10 cases of acalculous cholecystitis were identified and reviewed. All were male, with a mean age of 29 yr and mean burn area of 56.2% of the total body surface, with a 33% third-degree component. Jaundice occurred in 6 patients, with serum bilirubin concentrations ranging from 2.5-30 mg/100 ml. In 6 of the patients acalculous cholecystitis was regarded as part of generalized massive bacterial invasion, with widespread seeding to lungs, liver, kidneys, adrenals, and prostate, and could not be singled out as being of much clinical importance. However, 4 patients showed localized acalculous cholecystitis with other complications such as superior mesenteric artery syndrome, and Curling's ulcer. Nine of 10 patients demonstrated dehydration, reflected by serum osmolality in excess of 305 milliosmoles/liter. There was remarkable paucity of clinical signs associated with the development of cholecystitis. Prolonged ileus without sepsis, obtundation and abdominal burns all masked symptoms and signs. Morphology of the gallbladder ranged from frank destruction and acute inflammation with neutrophil infiltration and many bacterial colonies, to predominant plasma cell infiltration with histiocytes, occasional eosinophilia, and blunted villi. Once the diagnosis of acalculous cholecystitis is made, laparotomy and cholecystectomy should be carried out immediately.

7975 THE PLASMA CLOT EXTRACTION OF BILIARY DUCT CALCULI: A PRELIMINARY REPORT. (E.) Lipton, S. (Maimonides Med. Ctr., Brooklyn, N. Y.), J. Caralps-Riera and J. Estrin. *Surgery* 70(5):746-750, 1971.

Plasma clot extraction of biliary duct calculi was performed in 15 patients by making a plasma clot cast of the major biliary ducts by simultaneous injection of the patient's plasma and bovine thrombin into the common duct. The homogeneous, continuous thrombus thus formed was allowed to set for 1-2 min, after which the common duct was opened between Guy sutures. The clot was then removed with a Randall forceps, and as it emerged, the well-formed cast buckled through the incision. The distal and proximal ends were drawn together, thus sweeping stones into the choledochotomy. To function optimally, the plasma thrombus must exhibit adequate tensile strength, elasticity, solubility in common duct bile, nonadherence to the biliary epithelium, and translucency. This procedure may prove to have some advantages over other biliary duct lithotomy procedures.

7976 POSTTRAUMATIC CHOLECYSTITIS. (E.) Howard, R. J. (U. Minnesota Hosps., Minneapolis) and J. P. Delaney. *JAMA* 218(7):1006-1007, 1971.

Case histories are briefly reported of 6 patients who developed acute cholecystitis while convalescing with multiple injuries from episodes of trauma. None had any previous symptoms of gallbladder or gastrointestinal disease. Five had fractures of one or more bones, but none had any evidence of intra-abdominal trauma. Half of the 6 patients were males. All 6 underwent cholecystectomy and 4 of the 6 gallbladders had stones, while all 6 had areas of gangrene. Four of the 6 patients had other complications of their trauma and/or surgery.

7977 CHRONIC CHOLECYSTITIS AND CHOLELITHIASIS: AN EXPERIMENTAL STUDY. (E.) Raha, P. K. (Inst. Postgrad. Med. Educat. Res., Calcutta, India), K. P. Sengupta and B. K. Aikat. *Indian J. Med. Res.* 59(6):873-879, 1971.

The interplay of dietary fat, serum lipid level, and infections in the genesis of chronic cholecystitis and cholelithiasis was studied in rabbits. In animals fed mustard oil, hydrogenated vegetable oil and sesame oil, and given a single i.v. injection of Escherichia coli, there was no increase of serum lipid fractions, no histological change in the gallbladder, and no microspheroliths or gallstones. In animals given cholesterol in addition to these edible fats and injected twice with E. coli, only animals fed cholesterol alone or with hydrogenated vegetable oil showed significant changes in serum cholesterol. In the animals fed cholesterol and hydrogenated vegetable oil, E. coli was isolated from the bile in 3 of 8 animals, 2 of which showed definite gallstone formation. All 8 animals showed microspheroliths under the polarizing microscope and chronic cholecystitis histologically. The components of stones induced in these experimental animals were similar to those of human gallstones, being mixed stones (calcium carbonate and cholesterol, vaterite, or bilirubinate) but appearing macroscopically like pigment stones.

7978 METABOLISM OF DEOXYCHOLIC ACID IN BILE FISTULA PATIENTS. (E.) Hanson, R. F. (U. Minnesota Med. Sch., Minneapolis) and G. Williams. *J. Lipid Res.* 12(6):688-691, 1971.

Sodium deoxycholate-24-^{14}C was administered by slow i.v. injection to 2 patients with complete external bile fistulas. Almost 72% of the total reactivity recovered in bile was excreted in the first 24 hr. Chromatography showed over 94% of the radioactivity eluted in a single peak in the 40% benzene fraction (the dihydroxy acid zone). The remainder was distributed as very small peaks, none of which migrated with the mass of cholic acid. The largest fraction migrated with deoxycholic acid. After further chromatography, 3 developments, methanol elution, and recrystallization, the specific activity of methyl deoxycholate prepared from ethyl acetate recrystallization was unchanged from the specific activity of deoxycholic acid. Of the recovered radioactivity 85% of the deoxycholate was excreted as glycine conjugates and 13.3% as taurine conjugates. No appreciable amount of sulfated esters of deoxycholate was found. Therefore, deoxycholic acid metabolism in man involves conjugation with glycine and taurine, and the human liver is not able to rehydroxylate deoxycholate to any great extent.

7979 OBSTRUCTIVE JAUNDICE CAUSED BY HEPATIC ARTERY ANEURYSM. DEMONSTRATION BY RADIONUCLIDE IMAGING TECHNIQUES. (E.) Mehnert, P. J. (Yeshiva U. Albert Einstein Coll. Med., New York, N. Y.) and L. M. Freeman. *J. Nucl. Med.* 12(11):761-762, 1971.

A case is briefly presented of a 75-yr-old male with no relevant past history who presented with a 2-week course of painless jaundice, pruritus, anorexia, acholic stools and dark urine. A liver scan with ^{99m}Tc-sulfur colloid showed decreased uptake in the left and medial right lobes consistent with a space-occupying lesion, and seria scans with ^{131}I-Rose Bengal suggested biliary-tract obstruction. Another liver scan with ^{131}I-human serum albumin showed activity in the area which had previously showed a filling defect wit the ^{99m}Tc label. Exploratory laparotomy reveale a large aneurysm adherent to the common duct in the region of the porta hepatis.

7980 PRIBRAM'S INCISION FOR CHOLECYSTECTOMY (E.) Jelly, O. (Ancoats Hosp., Manchester, England) and A. Gunn. *Br. J. Surg.* 58(8):613-616, 1971.

A modification of the Pribram incision was used on 71 patients who underwent gallstone operation The skin incision was made parallel to and 2 cm above the right costal margin, beginning near th midline and running laterally for about 15 cm. The modification employed, entailed leaving abou one-third of the medial part of the rectus miscl and sheath intact. The lower edge of the wound was retracted downwards, and the transversus abdominus muscle, the peritoneum and more latera the internal oblique muscle were incised 1 cm below the costal margin. Sixteen patients (22. were found to have common bile duct stones and patients (2.8%) had had a previous cholecystect None of the patients suffered a burst abdomen a none complained of a hernia. Three of the patients (4.2%) complained of scar irritation, usually from a brassiere or a corset while one developed an unnoticed 2 cm herniation through the wound. None of the patients complained of weakness of the abdominal wall and there was no evidence of this. This incision seems to give good biliary exposure and a more secure closure than any other, and the peritoneal wound is on the periphery of its adhesion-forming surface.

7981 THE DIAGNOSIS OF CHOLEDOCHOLITHIASIS. (E.) Mullen, J. L. (U. Pennsylvania Hosp., Philadelphia), F. E. Rosato, E. F. Rosat W. T. Miller and M. Sullivan. *Surg. Gynecol. Obstet.* 133(5):774-778, 1971.

The records of 416 patients who underwent intraoperative cholangiography or choledochostomy, o both, were reviewed with regard to the diagnosi and treatment of common bile duct stones. Cyst duct cholangiography was performed in 316 patie and, of these, 241 were considered normal and 7 showed abnormalities (29 being definitely abnor and 46 possibly abnormal). The common bile duc of 43 of these 75 patients were explored and stones were found in 18, whereas the other 32 patients were unremarkable at the time of the follow-up examination. Thus, abnormal cystic duct cholangiograms predicted a significant number of common bile duct stones. Thirty-two of 121 patients who underwent choledochostomy had an abnormal T-tube cholangiogram after surgery, and 10 of them were ultimately found to have common bile duct stones. The most reliable indications of choledocholithiasis were dilated common bile duct, jaundice, elevated serum alkaline phosphatase level and elevated serum bilirubin level. No common bile duct stones were found in any of the 108 patients who had no indications. The incidence of common bile duct stones increased with the number of indicators present and correlated most strongly with intraoperative factors. The combination of preoperative and intraoperative indicators was more effective than either indicator separately in predicting the presence of common bile duct stones.

7982 ABSORPTION OF WATER, UNCONJUGATED BILIRUBIN, AND SODIUM GLYCODEOXYCHOLATE BY THE RABBIT GALLBLADDER WITH DIETARY-INDUCED GALLSTONES. (E.) Kyd, P. A. and I. A. D. Bouchier (Roy. Free Hosp., London). *Gastroenterology* 61(5):723-733, 1971.

The in vitro absorption of unconjugated bilirubin, sodium glycodeoxycholate and water by gallbladders of normal rabbits was compared with absorption by gallbladders of rabbits with dietary-induced gallstones using an everted sac preparation. The bile of rabbits fed the lithogenic diets showed a significant increase in cholesterol content. No difference was observed between groups with respect to the rate of water absorption, indicating no impairment of ability of the gallbladder with stones to concentrate bile. Whereas no difference was observed in the absorption of bilirubin, glycodeoxycholate absorption was markedly decreased in the gallbladders of animals with stones. Water transport was inhibited by 2,4-dinitrophenol but this compound had no effect on the rate of absorption of either bilirubin or glycodeoxycholate. Thus, formation of gallstones does not seem to be associated with an increase in bile salt absorption in this model.

7983 A LONGITUDINAL CYSTIC DUPLICATION OF THE GALLBLADDER. (E.) Raeburn, C. (Whipps Cross Hosp., London). *J. Pathol.* 104(3): 216-217, 1971.

A duplicated gallbladder was found at autopsy in a 86-yr-old male who died of pyelonephritis. The gallbladder, of usual shape and with a normal cystic duct, had a tense elastic cyst attached to its medial aspect. The cystic artery divided into equal branches, the lateral going to the posterior wall of the gallbladder and the medial to the posterolateral wall of the cyst. There were shallow grooves on the outer wall indicating the anterior and posterior borders of the common longitudinal wall. The wall of the cyst consisted of a few collagen fibers lined by flattened cells with areas of low columnar ciliated epithelium and a few small goblet cells. Where the cyst came in contact with the gallbladder there was an incomplete layer of attenuated muscle fibers. This anomaly probably resulted from a persistent longitudinal fission in the wall of the embryonic bud from which the gallbladder is derived.

7984 JAUNDICE IN ACUTE CHOLECYSTITIS. (E.) Watkin, D. F. L. (Roy. Infirm., Sheffield, England) and G. G. Thomas. *Br. J. Surg.* 58(8): 570-573, 1971.

The relationship between jaundice and choledocholithiasis was studied in a series of 144 patients with acute cholecystitis. Jaundice was observed in 32 of the patients (22.2%), the female to male ratio (2:1) being similar for jaundiced and non-jaundiced patients. Stones were found in the common bile duct in 22 of 30 patients with jaundice (73%) in whom the duct was examined at operation (or at autopsy in 1 case). Common bile duct stones were found in only 5 of 77 non-jaundiced patients (6.5%). Liver function tests performed during the acute episode in 58 patients who subsequently came to operation or autopsy indicated that serum bilirubin levels were more effective than serum alkaline phosphatase levels in distinguishing patients with duct calculi. In patients with serum bilirubin values above 2 mg%, 14 of 21 had common bile duct stones; in the range of 1 - 1.9 mg%, 7 of 14 had duct calculi; and with bilirubin values below 1 mg%, only 2 of 23 had choledocholithiasis. Thus, jaundice in acute cholecystitis seems to be a strong indication for surgical exploration of the common bile duct.

7985 CALCULOUS CHOLECYSTITIS IN A YOUNG AGE GROUP. (E.) Delashmutt, E. J. (Valley Clin., Fort Madison, Iowa). *J. Iowa Med. Soc.* 61(2):97-100, 1971.

7986 A CASE OF HEPATIC ADENOMA. (E.) Crispin, H. A. (Gen Hosp., Antwerp, Belgium). *Acta Chir. Belg.* 70(2):91-110, 1971.

7987 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Venkataraman, M. S. (Govt. Gen. Hosp., Madras, India) and M. G. Varadarajan. *Mediscope* 14(1):33-40, 1971.

7988 RESIDUAL GALLBLADDER AND CYSTIC DUCT STUMP AS CAUSES OF RECURRENT POST CHOLECYSTECTOMY COMPLAINTS. (Ger.) Fiedler, H. H. (Evangel. Hosp., Krankenh., Unna, Germany). *Chirurg* 42(6):283-285, 1971.

7989 THE CHOICE OF OPERATIVE PROCEDURE IN THE TREATMENT OF LITHIASIS OF THE COMMON BILE DUCT. (Ser.) Ciric, S. *Med. Pregl.* 24(7):303-306, 1971.

7990 CHOLELITHIASIS IN THE AGED SUBJECT. (Fr.) Gascard, E. (CHU Intern. Med. Serv., Marseille, France), R. Vignoli and P. Giordano. *Marseille Med.* 108(7-8):521-528, 1971.

7991 FRACTIONAL CHROMATIC DUODENAL CATHETERIZATION IN COMBINATION WITH CHOLECYSTOGRAPHY. (Rus.) Golovskoi, B. V. and L. N. Khoroshavina. *Klin. Med. (Mosk.)* 49(5):109-112, 1971.

7992 RECONSTRUCTION OF THE BILIARY TRACT WITH ROUX-EN-Y CHOLEDOCHOJEJUNOSTOMY. (Jap.) Sasamura, M. (Natl. Hosp., Hirosaki, Japan), H. Tsuchida and T. Mikami. *Iryo* 25(2): 91-101, 1971.

7993 CHOLECYSTOPATHY IN PERSONS WITH A RESECTED STOMACH. (Rus.) Dikhtenko, G. I. *Klin. Khir.* 51(6):55-60, 1971.

7994 TRANSHEPATIC DRAINAGE IN RECONSTRUCTION OPERATIONS ON THE BILE PASSAGES. (Sl.) (U. Komenskeho Ist Surg. Clin., Bratislava, Czechoslovakia) and F. Medla. *Lek. Obzor* 20(3): 165-169, 1971.

7995 ABOUT THE TREATMENT OF CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT. (Fr.) Hepp, J. and J. Mutricy. *Lyon Chir.* 67(3): 173-175, 1971.

7996 AN ANALYSIS OF PROGNOSTIC FACTORS IN ACUTE RENAL INSUFFICIENCY IN SURGICAL DISORDERS OF THE BILIARY DUCTS. (50 PERSONAL CASES). (Fr.) Funck Brentano, J. L. (Sch. Med., Paris), J. Chanard, D. Kleinknecht and C. Barbanel. *Ann. Gastroenterol. Hepatol. (Paris)* 7(2):157-171, 1971.

7997 TREATMENT OF CHRONIC EXACERBATED CHOLECYSTITIS WITH THE TETRACYCLINE DERIVATIVE METACYCLINE. (Bul.) Maleev, A., S. Petrovski and S. Stoyanov. *Vatr. Bolesti (Sofiia)* 10(1):117-121, 1971.

7998 ACUTE ACALCULOUS CHOLECYSTITIS WITH NORMAL CHOLECYSTOGRAM. REPORT OF A CASE. (E.) Johnson, J. W. *J. Ky. Med. Assoc.* 69(7):510-511, 1971.

7999 ACUTE FORMS OF CHOLECYSTITIS. (Por.) Da Silva, C. *Med. Univers. (Lisboa)* 14(2):91-99, 1971.

8000 INFUSION CHOLECYSTOGRAPHY: A STUDY OF THE ROENTGEN DIAGNOSTICS AND LABORATORY FINDINGS. (Ger.) Lohr, E. (Ruhr U. Klin., Essen, Germany), H. B. Makoski and W. Hoffmann. *Med. Welt* 22(21):875-878, 1971.

8001 PRIMARY CARCINOMA OF THE GALLBLADDER. AN ACCOUNT OF 48 CASES. (Dan.) Brandrup, F. O. (Svendborg Hosp., Svendborg, Denmark). *Ugeskr. Laeger* 133(24):1160-1164, 1971.

8002 A CASE OF ANGIOMA AT THE AMPULLA OF VATER. (ARTERIOGRAPHIC DIAGNOSIS). (Fr.) Hivet, M. (St. Antoine Hosp., Paris), J. Poilleux, J. C. Mathey and J. Caroli. *Presse Med.* 79(3):97-98, 1971.

8003 EMERGENCY SURGICAL TREATMENT FOR ACUTE CHOLECYSTITIS. (Pol.) Pardela, M. (Med. Acad. Ist Surg. Clin., Zabrze, Poland), M. Glinski, A. Pigon and I. Wojakowski. *Pol. Przegl. Chir.* 43(3):483-487, 1971.

8004 VALUE OF CERTAIN RADIOLOGIC METHODS IN DISEASES OF THE GALLBLADDER (RADIOLOGIC AND CLINICAL OBSERVATIONS). (Rum.) Stanciu, G. (Radiol. Clin., Tirgu Mures, Rumania). *Rev. Med. (Tirgu Mures)* 17(1):93-96, 1971.

8005 CHOLECYSTOLITHIASIS IN A WOMAN WITH SITUS VISCERUM INVERSUS. (Pol.) Kandziora, J. (L. Rydygiera, Hosp., Wroclaw, Poland), L. Oleszkiewicz and A. Putowska. *Wiad. Lek.* 24(6):585-586, 1971.

8006 CARCINOMA OF THE GALLBLADDER. A CLINI APPRAISAL AND REVIEW OF 57 CASES. (E. Solan, M. J. and B. T. Jackson (St. Thomas's Hosp, London). *Br. J. Surg.* 58(8):593-597, 1971

8007 PERSONAL EXPERIENCE WITH RADIOLOGIC EXPLORATION OF THE EXTRAHEPATIC BILE DUCTS. (Sp.) San Julian, M. (U. Navarra Clin., Spain), F. Conchillo, H. Espinosa and F. Tajadur *Radiologia (Madr.)* 13(2):171-178, 1971.

8008 MALIGNANT NEOPLASMS OF THE EXTRAHEPATI BILE DUCTS. (E.) Aldrete, J. S. (U. Alabama Sch. Med., Birmingham). *Am. Surg.* 37(1 613-621, 1971.

8009 EXTRAHEPATIC CHOLESTASIS. ANALYSIS OF 74 CASES. (Por.) Vasconcellos, D. (Fed. U. Pernambuco Sch. Med., Recife, Brazil), J. Asfora, J. Regueira and P. de Paula Lopes. *Arq. Gastroenterol. (Sao Paulo)* 8(2):73-80, 197

8010 CHOLECYSTECTOMY IN THE AGED. (E.) Steiger, E. (U. Pennsylvania Hosp., Philadelphia), M. H. Seltzer and F. E. Rosato. *Ann. Surg.* 174(1):142-144, 1971.

See also numbers: 7502, 7503, 7522, 7811

8011 EFFECT OF FLUID ADMINISTRATION AND OPERATION ON THE MORTALITY RATE IN BARIUM PERITONITIS. (E.) Nahrwold, D. L. (Pennsylvania State U. Coll. Med., Hershey), J. H. Isch, D. A. Benner and R. E. Miller. *Surgery* 70(5):778-781, 1971.

Mongrel dogs received an i.p. injection of 200 ml of a sterile solution of 15% barium sulfate in water and were divided into 6 groups. The mortality rates were: 100% in dogs not given i.v. fluids or subjected to laparotomy (Group I); 88% in dogs not given i.v. fluids but laparotomized at 3-6 hr after injection for the removal of all i.p. fluid and barium (Group II); 73% in dogs not laparotomized but receiving 500 ml of Ringer's lactate solution i.v. during a 30-min period beginning 1 hr after injection of barium (Group III); 30% in dogs receiving Ringer's lactate as above and laparotomy (Group IV); 20% in dogs not laparotomized but receiving Ringer's lactate as above, and receiving an additional 450 ml of Ringer's lactate over a 60-min period beginning 6 hr after barium injection (Group V); 9% in dogs subjected to laparotomy and 2 infusions of Ringer's lactate (Group VI). No significant differences in mortality rates were observed between groups I and II, I and III, III and IV and V and VI. There were significant differences in mortality rates between Groups I and V, II and IV, II and VI and III and V. In dogs surviving 8 weeks and than sacrificed, there was no i.p. fluid and the barium was encapsulated in clumps scattered throughout the peritoneal cavity. With regard to severity of adhesions, there was no significant difference in surviving dogs who had operative removal of barium and those who did not.

8012 IMMUNOGLOBULIN STUDIES IN GASTROINTESTINAL DYSFUNCTION WITH SPECIAL REFERENCE TO IgA DEFICIENCY. (E.) Bjernulf, A. (Univ. Hosp., Uppsala, Sweden), S. G. O. Johansson and A. Parrow. *Acta Med. Scand.* 190(1-2):71-77, 1971.

The levels of immunoglobulins G, A, M, D and E were studied in 25 women and 9 men with symptoms of gastrointestinal dysfunction, mainly diarrhea. Compared with age-matched controls, the mean levels of IgG and IgA were normal, that of IgM high, and those of IgD and IgE low. Brief case histories of 4 who were found to have no detectable concentration of IgA in their serum are presented. All 4 were women. Two of them were uniovular twins, who also had increased levels of IgG and IgM. The other 2 were hypogammaglobulinemic, and both revealed abnormal histology on intestinal biopsy. The relationship between IgA deficiency and gastrointestinal dysfunction is doubtful.

8013 A NEW MODEL FOR PRODUCING EXPERIMENTAL FECAL PERITONITIS. (E.) Sharbaugh, R. J. (Med. U. South Carolina, Charleston) and W. M. Rambo. *Surg. Gynecol. Obstet.* 133(5): 843-845, 1971.

Peritonitis was induced in dogs using a sterile fecal suspension in combination with Escherichia coli, Pseudomonas aeruginosa, or a mixture of E. coli, klebsiella/aerobacter, Enterococcus species and Staphylococcus aureus, which was introduced into the peritoneal cavity through a 10-cm. midline incision. Neither organisms nor sterile feces alone was able to produce peritonitis. Twelve hr after contamination, the hematocrit value had risen to an average of 65%, and leukopenia was observed. Eight of 10 dogs with peritonitis induced by E. coli and sterile feces died within 40 hr, all 11 dogs treated with Pseudomonas and sterile feces died within 45 hr, and all 4 dogs given the bacterial mixture with sterile feces died within 48 hr. Local and systemic effects which were observed included copious peritoneal exudate and contraction of the plasma volume. This method allows the investigator to induce a fatal bacterial peritonitis in the dog without the use of hemoglobin, strangulation fluid, or whole blood, as well as allowing the use of standardized inoculum based on body weight for which the exact bacterial composition is known. Thus, the effects of infection by single or multiple bacterial species as the cause of fecal peritonitis can be studied.

8014 HYPERNEPHROMA PRESENTING AS AN ACUTE ABDOMEN. (E.) Orr, W. A. (U. Virginia Sch. Med., Charlottesville) and J. Y. Gillenwater. *Surgery* 70(5):656-660, 1971.

Two cases are briefly reported. A 38-yr-old woman was subjected to appendectomy with removal of a grossly normal appendix which showed histological evidence of focal chronic periappendicitis. Two months later she developed chronic anorexia and weight loss, and 5 months after appendectomy presented with a large tender right lower quadrant mass. After renal arteriography she was subjected to radical nephrectomy with removal of a hypernephroma. She died of widespread metastases 1 yr after appendectomy. A 72-yr-old male presented with abdominal pain, urinary retention and incoherence 2 weeks after a single episode of gross hematuria, dysuria and urgency. The pain was somewhat relieved by catheter removal of 2 liters of urine. Roentgenographic evidence of free air under the diaphragm necessitated laparotomy which revealed no abnormalities. He was readmitted 2½ months later with urinary outlet obstruction and an excretory urogram and arteriogram revealed a tumor. At radical nephrectomy a large hypernephroma was removed. He was alive and well after subsequent prostatectomy.

8015 THE CAUSE AND PREVENTION OF POSTOPERATIVE INTRAPERITONEAL ADHESIONS. (E.)

Ellis, H. (Westminster Hosp., London). *Surg. Gynecol. Obstet.* 133(3):497-511, 1971.

A review of the literature (174 references).

8016 STUDIES OF LYMPH IN CERTAIN DISORDERS OF THE LIVER, PANCREAS AND SMALL INTESTINE. (E.) Dumont, A. E. (New York U. Med. Ctr., N. Y.), C. L. Witte and M. H. Witte. *Am. J. Gastroenterol.* 56(4):346-351, 1971.

The occurrence of alterations in flow and composition of lymph in a variety of hepatic, pancreatic and small intestinal disease states is reviewed. In patients with hepatic cirrhosis, an enormous excess of lymph is formed and the efferent lymphatic vessels become widely distended and incompetent. Since there is little or no oncotic gradient between the plasma in the sinusoid and hepatic interstitial fluid, slight increments in hepatic venous pressure or in sinusoidal circulation time cause tremendous increases in the production of protein-rich hepatic lymph. In patients with advanced disease and/or bleeding esophageal varices, presinusoidal obstruction of the thoracic duct lymph occurs. Ascitic fluid and excess extrahepatic-splanchnic lymph originate from fluids which are low in protein, and little BSP appears in the thoracic duct lymph. Thoracic duct lymph from patients with cirrhosis usually appears hemorrhagic due to an abnormal number of intact RBC. The fact that distended, thin-walled lymph channels collapse, and that patients with cirrhosis improve after venting the thoracic duct, indicates that impairment to flow of excess lymph at the lymphatic-venous junction in the neck is an important factor in the disease. In patients with obstructive jaundice, levels of bilirubin in thoracic duct lymph approximate those in blood, and blood as well as lymph seems to transport excess BSP from the obstructed liver. Lymph flow from the pancreas was impeded by fibrosis and scarring of the pancreas and surrounding tissues. Fluid formed in the pancreas in excess of the amount that could be carried into the intestine could be drained by a lymphatic pathway which transports enzymes to the thoracic duct. An underlying disturbance in lymph formation may also be associated with Whipple's disease.

8017 IMMUNOGLOBULIN A AND M LEVELS IN PREMATURE INFANTS WITH GASTROENTERITIS. (E.) Panayoutou, P. (U. Athens 1st Obstet. Gynecol. Clin.), C. Papadatos, G. Papaevangelou, D. Alexiou, A. Skardoutsou and E. Kourea. *Arch. Dis. Child.* 46(249):671-675, 1971.

For a period of 1 month, 11 premature babies with a bacteriologically confirmed gastroenteritis were followed. Mean levels of immunoglobulin A in healthy premature infants at age 10, 20 and 30 days were 4.8, 15.6 and 24.4 mg/100 ml, resp. However, in the 11 children with gastroenteritis mean IgA levels at ages 10, 20 and 30 days were 35.8, 64.6 and 73.8 mg/100 ml, resp. Thus there was a significant increase of serum IgA and a significant increase of IgM level in infected babies as compared to the healthy prematures. Results support the concept of local antibody synthesis and suggest that the intestinal antibody system responds rapidly to local antibody stimulation resulting from the acquisition of the intestinal bacterial flora. In the course of this localized infection, replication of bacteria in the lymphoid tissue of the intestinal wall stimulate immunologically competent cells in direct proximity to the gastrointestinal tract, causing increased serum IgA levels.

8018 RENAL EXCRETION OF WATER IN INFANTS WITH ACUTE GASTROENTERITIS. (E.) Patrick, J. (St. Thomas's Hosp., London). *Arch. Dis. Child.* 46(249):641-645, 1971.

Eight infants with severe acute gastroenteritis were given water loads of 20 ml/kg body weight during their recovery. Plasma osmolality was initially high in all the infants although not all were hypernatremic. Weight changes in all the infants followed a similar pattern, with an initial rapid gain followed by a peak or plateau before normal growth was resumed. When the water load was given after the peak weight during recovery there was an appropriate rise in urine flow and free water clearance with a sharp fall in urinary osmolality. However, when the water load was given before the peak weight gain, the renal response was minimal or absent. Sodium excretion rose and creatinine clearance increased in association with water loading after the peak weight had been reached. The fluid losses in gastroenteritis also lead to a prolonged fall in glomerular filtration rate. When planning fluid replacement with hypotonic fluids, dangerous dilutional hyponatremia must be considered as a complication since the normal water diuretic response is inhibited.

8019 GENTAMICIN IN Esch. coli GASTROENTERIT (E.) Coetzee, M. (Red Cross War Mem. Child. Hosp., Cape Town, South Africa) and P. M. Leary. *Arch. Dis. Child.* 46(249):646-650, 1971.

Ninety Cape Town infants with acute gastroenteri and from whose stools enteropathic Escherichia coli was isolated, were treated with gentamicin. The average age of patients was 4.3 months and 64% were below the third Boston weight percentil Clinical response to gentamicin for 5 days was dramatic with rapid decrease in the number of stools. Within 36 hr most infants were able to maintain hydration without i.v. supplementation. On discharge, stools were normal in frequency and consistency, and the infants were retaining milk feeds adequate for their weight and age. On the gentamicin regimen 92% of the infants recovered, while one died. Although 98% of Escherichia coli are still sensitive to gentamic the possibility of future acquired resistance by transfer of R factors in this pathogenic organism must be considered.

8020 RESTING AND PENTAGASTRIN-STIMULATED GASTROESOPHAGEAL SPHINCTER PRESSURE IN PATIENTS WITH ZOLLINGER-ELLISON SYNDROME. (E.) Isenberg, J. (VA Ctr., Los Angeles, Calif.), A. Csendes and J. H. Walsh. *Gastroenterology* 61(5): 655-658, 1971.

The mean of each of the 5 preinjection gastroesophageal sphincter pressures in 6 patients with Zollinger-Ellison syndrome to saline, pentagastrin (0.025, 0.1, 0.4 and 1.6 µg/kg) ranged from 24.5 to 29.7 mm Hg as compared to 10.9 to 13.9 mm Hg in control subjects. Graded doses of pentagastrin produced graded increases in the sphincter pressures. In both the control and the Zollinger-Ellison group, each dose of pentagastrin produced a significant increase in the pressure. The 0.4 µg/kg dose produced the greatest main peak response in both groups. Following the 0.1, 0.4 and 1.6 µg/kg doses, no difference between the 2 groups was found in increase in gastroesophageal sphincter pressures above preinjection pressure. Mean sphincter length was about the same in the Zollinger-Ellison and control groups. A high degree of correlation was found when the fasting plasma gastrin was compared with the mean preinjection gastroesophageal sphincter pressures for each Zollinger-Ellison subject. The only untoward effects were seen after 0.4 and 1.6 µg/kg doses of pentagastrin in 8 of 14 subjects who experienced retrosternal tightness for approximately 30 sec.

8021 GASTROINTESTINAL COMPLICATIONS OF COLLAGEN VASCULAR DISEASES. SURGICAL IMPLICATIONS. (E.) Matolo, N. M. (U. Utah Coll. Med., Salt Lake City) and D. Albo, Jr. *Am. J. Surg.* 122(5):678-682, 1971.

A retrospective study reviewing the clinical case records of 122 patients with the diagnosis of collagen vascular disease revealed major intra-abdominal complications in 26 patients. Gastrointestinal ulceration with hemorrhage was the most common complication accounting for 36.4, 28.2 and 30% of the complications seen in systemic lupus erythematosis, periarteritis nodosa and scleroderma, resp. Other complications included hemorrhage without ulceration, ulceration without hemorrhage, and small intestinal perforation, obstruction or infarction. The majority of patients in whom intra-abdominal complications developed were on steroid therapy, which itself may predispose to or induce gastrointestinal complications. Ten of the 14 patients with lupus were treated medically with steroids, antibiotics, ulcer regimen and transfusion; 6 of these died. The 4 remaining patients treated surgically (abscess drainage, small intestine or gastric resection) survived. Seven of 9 patients with periarteritis nodosa were treated nonoperatively and 4 died. Two patients were operated upon and survived. One had a superior mesenteric artery thrombectomy and the other, vagotomy and antrectomy. Three patients with scleroderma were treated medically and 2 died of gastrointestinal hemorrhage, the other of peritonitis. All but 3 of the patients who died following medical management had potentially surgically correctable lesions.

8022 THE DISTRIBUTION OF AMYLOID SUBSTANCE. A STUDY WITH THE LIGHT MICROSCOPE OF GENERALIZED CASES AT AUTOPSY. (Por.) Gomes D'Oliveira, J. J. (Civil Hosp., Lisbon, Portugal). *J. Soc. Cienc. Med. Lisboa* 135(4):289-349, 1971.

8023 OPERATIVE MANAGEMENT OF PANCREATIC AND DUODENAL INJURIES. (E.) Smith, A. D., Jr. (Tulane U. Sch. Med., New Orleans, La.), W. C. Woolverton, R. F. Weichert and T. Drapanas. *J. Trauma* 11(7):570-576 & 582-585, 1971.

8024 HIATUS HERNIA WITH PROLAPSE OF THE WHOLE STOMACH AND THE COLON INTO THE RIGHT THORAX. (Jap.) Miyamura, T., J. Tominaga and T. Imai. *Kanazawa Irigaku Sosho (J. Radiol. Phys. Ther. Univ. Kanazawa)* 87(1):109-115, 1971.

8025 INITIAL MENTAL DISORDERS IN CARCINOMA OF PANCREAS AND STOMACH. (E.) Jacobsson, L. (U. Umea Dept. Psychiatr., Sweden) and J. O. Ottosson. *Acta Psychiatr. Scand.* Suppl. 221:120-127, 1971.

8026 ACUTE SURGICAL DISEASES OF ABDOMINAL ORGANS AS COMPLICATIONS OF HORMONAL THERAPY. (Rus.) Gluzman, A. M., Z. K. Duplik and L. D. Kostinov. *Klin. Med. (Mosk.)* 49(6): 148-152, 1971.

8027 PREVALENCE OF PATHOGENIC ENTERIC BACTERIA IN CHILDREN OF 31 PANAMANIAN COMMUNITIES. (E.) Kourany, M. (Gorgas Mem. Lab., Panama, Panama), M. A. Vasquez and L. J. Mata. *Am. J. Trop. Med. Hyg.* 20(4, Pt. 1): 608-615, 1971.

8028 SCLEROSIS OF ARTERIES OF THE ABDOMINAL VISCERA. PATHOMORPHOLOGIC DATA. LOCALIZATION AND INCIDENCE. (Ger.) Zahn, D. G. H. (Univ. Pathol. Inst., Heidelberg, Germany) and K. Goerttler. *Arch. Kreislaufforsch.* 64(3-4):235-272, 1971.

8029 FREE PERFORATION OF A GASTROCOLIC FISTULA. (E.) Ger, R. (Albert Einstein Coll. Med., Bronx, N. Y.), H. Adler and R. G. Bernstein. *Am. J. Surg.* 122(1):115-116, 1971.

8030 THE IMPORTANCE OF DISORDERS OF GASTRODUODENAL MOTILITY IN CHILD PATHOLOGY. (Fr.) Careddu, P. (U. Milan, Italy). *Med. Hyg. (Geneve)* 29(949):198-199, 1971.

8031 TREATMENT OF CHOLERA IN ENDEMIC AREAS. PRESENT STATUS. (Fr.) Thomas, J. *Med. Trop.* 31(1):93-106, 1971.

8032 ROENTGEN AND PATHOLOGICAL CHANGES IN THE GASTROINTESTINAL TRACT IN HERPES ZOSTER GENERALIZATA: A UNIQUE CASE AND BRIEF REVIEW. (E.) Khilnani, M. T. (Mt. Sinai Sch. Med., New York, N. Y.) and R. J. Keller. *Mt. Sinai J. Med.* 38(3):303-310, 1971.

8033 SOME ASPECTS OF THE ZOLLINGER ELLISON SYNDROME FROM THE SURGEON'S VIEWPOINT. (Ger.) Enderlin, F. (Univ. Surg. Clin., Basel, Switzerland). *Chirurg* 42(3):106-111, 1971.

8034 CYSTS OF ABDOMINAL ORGANS. (Pol.) Koszarski, J. (Med. Acad 3rd Surg. Clin., Stettin, Poland). *Pol. Przegl. Chir.* 43(5):729-735, 1971.

8035 EXPERIMENTAL STUDIES ON GRANULOMATOUS PROCESSES IN THE DIGESTIVE TRACT. III. TISSUE EOSINOPHILIA IN PRODUCTIVE REACTIONS OF THE ALIMENTARY TRACT TO FOREIGN BODIES. (Pol.) Wilkoszewski, R. (Med. Acad. Inst. Pathol. Anat., Cracow, Poland). *Patol. Pol.* 22(2):369-375, 1971.

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PARASITOLOGY

8064 MALABSORPTION IN ANKYLOSTOMIASIS. (E.) Nath, K. (GSVM Med. Coll., Kanpur, India), B. K. Sur, K. C. Samuel, B. K. Gupta, H. S. Mital, O. N. Seth and S. Saxena. *Indian J. Med. Res.* 59(7):1090-1099, 1971.

The frequency and degree of malabsorption of nutrients and its relation to histopathological changes in the small intestine was studied in 60 patients with ankylostomiasis. Seventeen patients (38%) had abnormal (more than 6 g/day) fecal fat content, while 14 (26%) showed abnormally low (less than 1 g/5g/5 hr) xylose excretion. Nineteen of 42 patients on whom jejunal biopsy was performed showed normal mucosa, while 10 (24%) had blunting and shortening of villi with early fusion at the base, as well as an irregular overlying epithelium with inflammatory cell infiltration. Eleven patients (26%) showed marked stunting of villi and basal fusion, short epithelial cells with irregularly placed nuclei and infiltration of monocytes and plasma cells. Two cases (5%) showed complete loss of villi and marked irregularity of the surface epithelium.

A significant relationship between intestinal mucosal changes and severity of infestation as well as the fecal fat and urinary xylose excretion was observed.

8065 PATHOLOGY OF LIVER CIRRHOSIS IN EXPERIMENTAL SCHISTOSOMIASIS JAPONICA. (E.) Tsutsumi, H. (Kurume U. Sch. Med., Japan). *Acta Pathol. Jap.* 21(2):243-255, 1971.

Young male rabbits received a single s.c. inoculation of about 300 cercariae of Schistosoma japonicum obtained from Oncomelania nosophora, which had been infected naturally. By the end of the third week there were immature schistosomes in the branches of intrahepatic veins. No remarkable changes in hepatic tissues were seen before the deposition of ova occurred at the fourth or fifth week. By week 30 the histological picture was that of liver cirrhosis of type A. In most animals localized portal phlebitis or periphlebitis due to ova emboli was seen to be undergoing repair by week 18. In full-blown cirrhosis, there was simultaneous development and spread of fibrosis and repair by proliferation of hepatocytes. After the thirtieth week, repair tended to predominate. By the fortieth week, organization and recanalization were noted in ova emboli of larger portal branches, with a hemangioma-like appearance similar to the pipe-stem fibrosis seen with human cirrhosis secondary to Schistosoma japonicum. Budding of hepatocytes was noted within this fibrosis. By 60 weeks, cicatricial depressions remained only in a small part of the liver surface which now looked almost normal, as did the course of most of the blood vessels.

8066 ULTRASTRUCTURE OF HEPATIC PARENCHYMA IN MURINE HEPATOSPLENIC BILHARZIASIS. (E.) Ramadan, M. A. (Med. Res. Inst., Alexandria UAR). *Virchows Arch.* [*Zellpathol.*] 9(1):1-15, 1971.

Ultrastructural changes in the rough-surfaced endoplasmic reticulum of liver cells in mice infected with Schistosoma mansoni were studied. Consistent dilatation in the cisternae with flattening in their midportions and dispersed collections of round to oval vesicles pinched off from the elongated cisternae, were observed as early as 2 weeks after infection with 100 or 200 cercariae. Vesicles of the smooth-surfaced endoplasmic reticulum showed slight distention and propagation irrespective of the infection duration and intensity, more conspicuous in the periportal area. A hypertrophied Golgi complex manifested by variably dilated saccules and vacuoles was seen. Saccules and attached vacuoles were filled with an amorphous substance of moderate electron density. Microbodies, unaffected at 2 weeks, showed an increase in number in all hepatic regions (periportal, midzonal or centrilobular) at 8 weeks of infection, regardless of infection intensity. Cytoplasmic fibrils (10-90 millimicrons thick) were often observed near the canalicular or sinusoidal poles of the cell lying parallel or oblique to the cell membrane. The cell membrane between adjacent parenchymal cells showed no alteration; only adjacent to the inflammatory granulomas did the surfaces of the parenchymal cells possess a few short microvilli. The above conditions represent the toxic effects caused by the parasite, and the local edema set up around the inflammatory granulomas enclosing the embolized eggs of the parasite.

8067 CLINICAL SIGNIFICANCE OF STRONGYLOIDES IN AFRICAN CHILDREN. (E.) Bwibo, N. O. (Makerere Med. Sch., Kampala, Uganda). *J. Trop. Med. Hyg.* 74(4):79-81, 1971.

8068 CYTOLOGICAL AND HISTOCHEMICAL STUDY OF HUMAN JEJUNAL MUCOSA IN NORMAL INDIVIDUA AND IN BILHARZIAL (SCHISTOSOMAL) HEPATIC FIBROSIS PATIENTS. (E.) Dorry, K. L. (Alexandria U. Med. Sch., Egypt.), M. E. Fikry, H. A. Malaty and A. El Guindi. *Alexandria Med. J.* 17(1):34-47, 1971.

8069 A STUDY OF HEPATIC AMOEBIASIS WITH SPECIAL REFERENCE TO RADIOLOGICAL AND LABORATORY DIAGNOSIS. (E.) Chari, M. V., B. N. Gadiyar, T. Bharathan and H. Mohan Kamath. *Antiseptic* 68(4):247-256, 1971.

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8073 A PERORAL BIOPSY STUDY OF THE JEJUNUM IN HUMAN SCHISTOSOMIASIS MANSONI. (E.) Castro, L. P. (UFMG Sch. Med., Minais Gerais, Brazil), R. Dani and R. J. Alvarenga. *Rev. Inst. Med. Trop. Sao Paulo* 13(2):103-109, 1971.

8074 EXPERIENCE WITH LAPAROSCOPIC DIAGNOSIS OF HEPATIC HYDATID DISEASE. (Sp.) Solis Herruzo, J. A. (Cent. U. Sch. Med., Madrid) J. A. Sanchez Ramos, E. Grino Prieto and J. Pardo Rueda. *Rev. Clin. Esp.* 120(5):431-436, 197

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μ	micromolar
mC, μC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
NAD	nicotanamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotide phosphate
NADPH	reduced nicotinamide adenine dinucleotide phosphate
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

8075 MUCOSAL SURFACE CONVOLUTIONS. CELLULAR AGGREGATES OBSERVED ON THE ENTERIC SURFACE OF VARIOUS SPECIES. (E.) Pfeiffer, C. J. (Mem. U. Newfoundland, St. Johns, Canada). *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):225-230, 1971.

Gastric or intestinal samples were obtained from a variety of species and fixed for electron microscopy scanning. Mucosal surface convolutions were observed on the luminal surface of the enteric mucosa from the gastric fundus to the rectal mucosa in the rat, mouse, ferret, squirrel monkey, guinea pig and man. These surface convolutions were found to demarcate aggregates of surface mucous cells consisting of approximately 5-60 cells. The number of cells per aggregate depended upon the site along the alimentary canal and species. Within any particular locus the number of surface cells encompassed by 1 convolution was variable; usually 15-30 cells were segregated by surface convolutions on the intestinal villi while larger numbers were contained on the gastric surface. Openings to gastric pits or pyloric or intestinal glands lie within the surface convolutions, usually where 2 or 3 convolutions converge. The fissures upon the enteric surfaces formed by the convolutions were not strictly identical to the glandular opening they contained. Openings to goblet cells were frequently seen on the villous surfaces, but these openings did not lie in the surface convolutions. Surface convolutions were either regularly shaped (rat gastric antrum), irregularly shaped (human gastric antrum), or somewhat longitudinally oriented (mouse rectum). The breadth of the fissures formed by the surface convolutions is approximately 5 microns or the width of 1 cell.

8076 "STERNZELLEN" IN THE LIVER: PERISINUSOIDAL CELLS WITH SPECIAL REFERENCE TO STORAGE OF VITAMIN A. (E.) Wake, K. (Osaka City U. Med. Sch., Japan). *Am. J. Anat.* 132(4): 429-461, 1971.

The "Sternzellen" in normal rat and rabbit liver and in the liver of animals injected with excess vitamin A were examined with the light and electron microscopes. Stellate perisinusoidal cells were found located in the space of Disse, separated from the sinusoidal lumen by the endothelium. Lipid droplets within the cytoplasm of these cells reacted intensely with gold chloride. The lipid droplets imparted intense vitamin A fluorescence under the fluorescence microscope, and increased markedly following the administration of excess vitamin A. The "Sternzellen" were identical with cells described as interstitial or fat-storing cells by others, and were different from the so-called Kupffer's cells of the liver reticulo-endothelial system.

8077 THE ISOLATED ALLOGRAFT POUCH: A USEFUL METHOD FOR MONITORING SMALL BOWEL ALLOGRAFTS. (E.) Kunlin, A. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.), J. P. Gaston, M. H. Shiu, S. J. Winawer and J. G. Fortner. *Surg. Forum* 22:237-239, 1971.

Mongrel dogs (11) were given total small bowel transplants, with an isolated allograft pouch brought out as a blind jejunostomy and a Y-loop at the proximal anastomosis brought out as a second open jejunostomy. Another group of dogs (5) were given a short auxiliary jejunal allograph divided also into a blind pouch and an open Y-loop; these animals had none of their own bowels removed. Animals were immunosuppressed with azathioprine and prednisolone. Mean survival of the auxiliary loop dogs was 42 days, compared to 8 days for dogs receiving total transplants; the poor survival in the transplant group was not due to rejection, but rather to technical failures, massive fluid losses, malabsorption and infection. Morphological changes were similar in the blind pouch and the open Y-loop, and during rejection, consisted of mononuclear cells infiltration, shortening of the villi and progressive epithelial damage. Reversible rejection episodes were seen in 2 long-surviving dogs. Mucosal biopsies of the pouch seem to reflect the histological state of the entire allograft and might be useful in monitoring the rejection process in human bowel transplants.

8078 A FREEZE-FRACTURE STUDY OF BULLFROG GASTRIC OXYNTIC CELLS. (E.) Forte, T. (U. California Donner Lab., Berkeley) and J. G. Forte. *J. Ultrastruct. Res.* 37(3-4):322-334, 1971.

The freeze-etch technique applied to glutaraldehyde-fixed gastric mucosa is extremely useful in determining the three-dimensional architecture of the Bullfrog oxyntic cell, particularly the apical surface membrane and the intracellular agranular membrane system. The apical surface of these cells possessed fingerlike microvilli in some cases and flattened lingulae in others. Flattened processes carrying microvilli were also present; this diverse morphology of the cell-free surface is consistent with observed structural changes which are related to the secretory state of the cell. Microvillar configuration is probably analagous to processes observed in a nonsecreting cell, irregular lingulate processes being associated with maximally-secreting oxyntic cells. In the smooth membrane system, tubules, not vesicles, were abundant and occasionally branched, but they terminated in blind, bulbous regions within the cytoplasm. The smooth membrane system was designated as bulbotubules. Inspection of the membrane fracture faces provided evidence consistent with the hypothesis that the inner luminal surface of the tubules was structurally analogous to the outer surface of the apical plasma membrane.

8079 ULTRASTRUCTURAL AND MORPHOMETRIC STUDY OF THE PARENCHYMAL LIVER CELLS OF THE RAT, FOLLOWING THE INHIBITION OF PROTEIN SYNTHESIS BY CYCLOHEXIMIDE. (Ger.) Riede, U. N. (U. Basel Pathol. Inst., Switzerland), C. Seebass and H. P. Rohr. *Virchows Arch.* [*Zellpathol.*] 9(1):16-27, 1971.

During the first 3-6 hr after a single i.p. injection of cycloheximide, rat parenchymal liver cells showed a significant increase of the number of rounded mitochondria and microbodies, accompanied by a considerable diminution of their size and a considerable reduction of the volume and surface density of smooth endoplasmic reticulum, as well as a reduction of the surface density (only) of rough endoplasmic reticulum. The number of free, as contrasted to membrane-bound, ribosomes was also greatly increased. This initial period was followed by a sharp increase of lysosomal activity, preceding a "restitution stage", which was characterized by proliferation of the Golgi apparatus, an overcompensatory regeneration of rough endoplasmic reticulum and a significant, transitory increase of the number of fat bodies. This final stage of response tended to end within 24-48 hr after injection.

8080 AN UNUSUAL INTIMATE RELATIONSHIP BETWEEN ENDOCRINE CELLS AND OTHER TYPES OF EPITHELIAL CELLS IN THE HUMAN STOMACH. (E.) Rubin, W. (Med. Coll. Pennsylvania, Philadelphia). *J. Cell Biol.* 52(1):219-227, 1972.

In random sections of normal human gastric mucosa, the endocrine cells frequently appeared embedded within individual epithelial cells of all varieties, such as chief, parietal, undifferentiated neck, mucous gland, pyloric gland, and pit cells. Of 298 endocrine cells, 97 (33%) appeared embedded or surrounded at least on their lateral and superior surfaces by single epithelial cells. In atrophic gastric mucosa where endocrine cells are more abundant, this morphological relationship between endocrine and other epithelial cells was even more apparent; single epithelial cells frequently enclosed more than one endocrine cell. Apposing cell membranes of both endocrine cells and surrounding epithelial cells exhibited a strong adenosine triphosphatase (ATPase) activity, but no alkaline phosphatase, acid phosphatase or thiamine pyrophosphatase activities. Inosine diphosphatase activity, similar to that of ATPase in distribution, generally required longer incubations and produced a lighter and more variable precipitate. The morphological relationship between endocrine and epithelial cells is somewhat similar to that between neurons and their satellite cells.

8081 MONONUCLEAR PHAGOCYTES (KUPFER CELLS) AND ENDOTHELIAL CELLS. IDENTIFICATION OF TWO FUNCTIONAL CELL TYPES IN RAT LIVER SINUSOIDS BY ENDOGENOUS PEROXIDASE ACTIVITY. (E.) Widmann, J.-J. (Boston City Hosp., Mass.), R. S. Cotran and H. D. Fahimi. *J. Cell Biol.* 52(1): 159-170, 1972.

On the basis of ultrastructural characteristics and peroxidase activity, 3 different types of cells in rat liver sinusoids could be differentiated. Typical peroxidase-positive cells (40% of hepatic sinusoid cells) exhibited electron opaque reaction product in the nuclear envelope and endoplasmic reticulum. These cells had abundant cytoplasm, were rich in cytoplasmic organelles and had numerous vacuoles and granules, and occasional tubular, vermiform invaginations. After colloidal carbon injection, a continuous line of carbon particles was seen attached to the cell membrane facing the luminal aspect of the hepatic sinusoid. Evidence of avid phagocytosis included occasional pseudopods and the presence of membrane-bounded phagosomes containing carbon particles. Latex particles (mean diameter 0.8 microns) were phagocytized exclusively by peroxidase positive cells. Peroxidase-negative cells, the typical wall formimg endothelial cells (48% of cells), possessed a smaller nucleus and had less cytoplasm and fewer organelles. Cytoplasmic extensions of these cells showed many micropinocytotic vesicles and exhibited fenestrations or sieve plates. These cells ingested small amounts of carbon (micropinocytosis), exhibited no carbon particle sticking on their membranes, and did not ingest larger latex particles. Fat-storing cells were peroxidase negative and totally nonphagocytic. The peroxidase reaction thus distinguishes typical mononuclear phagocytes or Kupffer cells of rat liver from endothelial lining cells.

8082 LIPOPROTEINS ASSOCIATED WITH THE GOLGI APPARATUS ISOLATED FROM EPITHELIAL CELLS OF RAT SMALL INTESTINE. (E.) Mahley, R. W. (Vanderbilt U. Sch. Med., Nashville, Tenn.), B. D. Bennett, D. J. Morré, M. E. Gray, W. Thistlethwaite and V. S. LeQuire. *Lab. Invest.* 25(5):435-444, 1971.

A rat small intestine epithelial cell fraction was prepared which contained a high concentration of Golgi apparatus. Among the Golgi particles were seen 2 separate types with respect to size: very low density lipoprotein particles which ranged in diameter from 250 to 800 angstrom A; and chylomicrons which were larger than 800 A in diameter. Both types of particles were found within the tubular network of the same Golgi complex. Secretory vesicles, which contained either chylomicrons or the lipoprotein particles, were associated with the same cisterna of a single Golgi apparatus; only rarely did a single vesicle contain both sizes of particles. The Golgi particles from the vesicles and tubules of the Golgi apparatus were floated at a density of 1.006 after the Golgi membranes were fragmented by sonication, and negative staining of these particles revealed 2 distinct populations of particles: 1 was in the range of 250-800 A; characteristic of the very low density lipoproteins; the second ranged from 900-2,500 A, characteristic of chylomicrons, and those larger than 1,500 A tended to occur in clusters. Using antiserum to the apoproteins of rat plasma very low density lipoproteins, after delipidation, by Ouchterlony immunodiffusion, there were found to be precipitin lines of identity between the intestinal Golgi particles, plasma very low density lipoproteins and plasma low density lipoproteins.

8083 PHOSPHORYLATED-INTERMEDIATE OF MICROSOMAL ATPASE FROM RABBIT GASTRIC MUCOSA. (E.) Tanisawa, A. S. (U. California Dept. Physiol. Anat., Berkeley) and J. G. Forte. *Arch. Biochem. Biophys.* 147(1):165-175, 1971.

A microsomal fraction was prepared from the gastric mucosa of rabbits and some biochemical aspects of an active magnesium-dependent adenosine triphosphatase (ATPase) were studied using ^{32}P-ATP. Labeling of the ATP with the ^{32}P was of 2 types: 1 showed rapid formation and turnover and was sensitive to hydroxylamine treatment; the other showed slow formation and turnover, and was insensitive to hydroxylaminolysis. The first type of labeling corresponded to the observed rapid ATPase activity and was studied further, revealing that the ^{32}P could not be extracted with lipid solvents. The possibility of an acyl phosphate linkage was further suggested by its actions under varying pH and its sensitivity to hydroxylamine. Incorporation of ^{32}P required Mg^{++}, but was not affected by Na^+ or ouabain. In the presence of thiocyanate, enzyme activity was depressed and the intermediate accumulated; the opposite was seen in the presence of K^+.

8084 PASSAGE OF FUCOSE-^{3}H LABEL FROM THE GOLGI APPARATUS INTO DENSE AND MULTIVESICULAR BODIES IN THE DUODENAL COLUMNAR CELLS AND HEPATOCYTES OF THE RAT. (E.) Bennett, G. (McGill U. Dept. Med., Montreal, Quebec, Canada) and C. P. Leblond. *J. Cell Biol.* 51(3):875-880, 1971.

Tritium-labeled fucose, a stable sugar selectively taken up into glycoproteins, was given by single injection to 2- to 3-week-old rats. The distribution of the glycoprotein was then determined at definite time intervals in the duodenal columnar cells and hepatocytes of the rat. The dense bodies of the duodenal cells showed a variable concentration of label with time. These bodies were classified as uniformly dense bodies, bodies with 1-3 vesicles, and multivesicular bodies (4 or more vesicles). Electron microscope radioautograph revealed that fucose was over the Golgi apparatus at 2 min, over dense bodies at 5 min., at 35 min., over all types of bodies with the least amount in the MVB. Few multivesicular bodies were found in liver cells. Over 80% of the total radioactivity overlay the Golgi apparatus in the liver cells at 2 min. The presence of acid phosphatase indicates that these bodies are lysosomes. These results indicate that the Golgi apparatus is the site of completion of synthesis for lysosomal glycoproteins.

8085 NEURAL CREST ORIGIN OF THE ENDOCRINE POLYPEPTIDE (APUD) CELLS OF THE GASTROINTESTINAL TRACT AND PANCREAS. (E.) Pearse, A. G. E. (Roy. Postgrad. Med. Sch., London) and J. M. Polak. *Gut* 12(10):783-788, 1971.

Cells possessing the cytochemical characteristics described as APUD (Amine Precursor Uptake and Decarboxylation), involving tyrosine metabolism, can be detected by formaldehyde-induced fluorescence. Seventy-eight embryos from 10 pregnant albino mice who had received a single i.p. injection of L-DOPA (100 mg/kg), were serially sectioned and examined for APUD cells. The period of gestation extended from the seventh to the twelfth day. The cells were noted at 7 to 8 days to travel down the central stream of the neural crest, traverse the mesenchyme between the neural tube and pharynx and to colonize the fourth pouch and the wall of the pharyngeal tube. At 10-11 days the amine precursor cells were detected in the wall of the definitive stomach, the duodenum, and the duct-like areas of the pancreas. It cannot be determined whether all endocrine polypeptide cells are of neural crest amine precursor origin, or if differentiation of epithelial cells of the gut also takes place. Environmental differences could modify an original single cell type to produce different hormones. Cells in a similar environment may produce different hormones through differences in innervation.

8086 THE EFFECT OF SAPONIFICATION UPON CERTAIN HISTOCHEMICAL REACTIONS OF THE EPITHELIAL MUCINS OF THE GASTROINTESTINAL TRACT. (E.) Culling, C. F. A. (U. British Columbia Dept. Pathol., Vancouver, Canada), P. E. Reid and W. L. Dunn. *J. Histochem. Cytochem.* 19(11): 654-662, 1971.

The effect of a variety of fixatives both with and without formalin on periodic acid-Schiff (PAS) reactivity of the gastrointestinal tract mucins before and after saponification was studied using specimens taken from man, guinea pigs, rabbits and rats. An increase in PAS reactivity which was independent of fixation and processing was observed after saponification in all specimens studied. Whereas in man and rat the increase in staining was confined to the ileocecal valve and below, in the guinea pig it was limited to the large intestine and rectum, and in the rabbit the difference was seen in the Brunner's glands, the ileocecal valve, the large intestine and the rectum. While in man the increase was not confined to any part of the crypts, in rats it was found mainly in the base, and in rabbits it occurred predominantly at the luminal end. In many cases the effect of saponification was associated with an increase in basophilia due to the presence of sulfate and/or other highly acidic groups. Thus, the increase in staining due to saponification may be due to an unmasking of sulfate and/or other highly acidic groups.

8087 STRUCTURE OF MAMMALIAN PORTAL VEIN: POSTNATAL ESTABLISHMENT OF TWO MUTUALLY PERPENDICULAR MEDIAL MUSCLE ZONES IN THE RAT. (E.) Ts'ao, C.-H. (U. Chicago Pritzker Sch. Med., Ill.), S. Glagov and B. F. Kelsey. *Anat. Rec.* 171(4):457-469, 1971.

Special structural features characteristic of the extrahepatic segment of mammalian portal veins are not present at birth but develop rapidly during early postnatal life. At birth, intimal and medial cells form a wall of poorly differentiated interdigitating rounded cells distinct from adventitia in rats. Within a week, the media is distinct from endothelium and has been partitioned into 2 smooth muscle zones, which attain their respective spatial orientations (longitudinal and circular) in the ensuing 2 weeks. Collagen and elastic fibers of the intervening medical fibrous layer are eventually oriented circumferentially while those of the adventitia are longitudinal. Inner smooth muscle zones become indistinguishable from usual vascular smooth muscle, while smooth muscle of outer zones acquire more mitochondria and pinocytotic vesicles than is usual, suggesting a relatively higher metabolic level. Vasa vasorum appear in the outer muscle layer at about 2 weeks and nerve fibers appear even later. Postnatal establishment of a special, double-layered neuromuscular structure may be related to the adaptation of the portal circulation to the effective closure of the ductus venosus.

8088 ISOLATION AND LONG-TERM CELL CULTURE OF EPITHELIAL-LIKE CELLS FROM RAT LIVER. (E.) Williams, G. M., E. K. Weisburger and J. H. Weisburger (NCI, Bethesda, Md.). *Exp. Cell Res.* 69(1):106-112, 1971.

The separation of fibroblast-like cells from epithelial-like cells of livers of 10-day-old rats and the maintenance of the obtained epithelial-like cell lines in long-term culture are described. The sequential passage of primary cultures achieved a separation of cell types resulting from a difference in adherence to the culture surface. The doubling time in 10% fetal calf serum was 48 hr for all lines. Of the 8 cell lines that were initiated, 2 stopped growing and subsequently died out after 2 and 3 months in culture; however, the others have maintained their morphology for up to 9 months of continuous culture. The plating efficiency for seeding at 2.5 x 10^5 cells per dish was about 80% in 5-15% serum for all cell lines. Newborn rats receiving 1.0 and 5.0 x 10^6 cells s.c. have been followed for 9 months with no evidence of tumorigenicity.

8089 ULTRASTRUCTURAL CORRELATION OF ENHANCED SODIUM ABSORPTION FOLLOWING SMALL BOWEL RESECTION. (E.) Tilson, M. D. (Yale U. Sch. Med., New Haven) and H. K. Wright. *Surg. Forum* 22:366-367, 1971.

Rats underwent a 50% small bowel resection, and 2 weeks later the epithelial cells from the remaining jejunum and ileum were examined with the electron and light microscopes. There was a conspicuous elaboration of the lateral cell membrane, which over-folded itself to occupy the entire apical cytoplasm of some of the cells, and enlarged intracellular spaces were seen. The microvilli were hypertrophied with marked increase in height of the brush border. These organelles are related to solute transport, and may account for the increased physiological activity associated with increased intestinal absorption after massive bowel resection.

8090 THE FINE STRUCTURE OF THE MONKEY SUBMANDIBULAR GLAND WITH A SPECIAL REFERENCE TO INTRA-ACINAR NERVE ENDINGS. (E.) Kagayama, M. (Tohoku U. Sch. Dent., Sendai, Japan). *Am. J. Anat.* 131(2):185-196, 1971.

8091 SOME RECENT CONTRIBUTIONS OF ANATOMY TO THE PHYSIOLOGY OF THE GASTROINTESTINAL TRACT. (E.) Wyburn, G. M. (U. Glasgow Dept. Anat., Scotland). *R.C. Rom. Gastroenterol.* 3(1):47-57, 1971.

8092 MITOCHONDRIAL HEXOKINASE FROM SMALL INTESTINAL MUCOSA AND BRAIN. (E.) Mayer, R. J. (U. Nottingham, Med. Sch., England) and G. Hubscher. *Biochem. J.* 124(3):491-500, 1971.

8093 GLUCAMYLASE ACTIVITY OF HUMAN INTESTINAL MUCOSA. (E.) Auricchio, S. (U. Naples 2nd Pediatr. Dept., Italy), F. Ciccimarra and E. Starace. *R.C. Rom. Gastroenterol.* 3(1):1-8, 1971.

8094 COMPARISON OF THE ADVANTAGES OF SEVERAL HISTOLOGICAL, ULTRASTRUCTURAL AND HISTOCHEMICAL TECHNIQUES FOR THE STUDY OF THE ENDOCRINE CELLS OF THE MUCOSA OF THE DIGESTIVE TRACT. (Fr.) Tusques, J., G. LeFranc, G. Pradal and A. L'Hermite. *Rev. Cent. Hosp. Univ. (Paris)* 17:23-27, 1971.

8095 EVIDENCE FOR THE PRESENCE OF NON-ADRENERGIC INHIBITORY NERVES IN THE HUMAN TAENIA COLI. (E.) Rikimaru, A. (Tohoku U. Sch. Med., Sendai, Japan), Y. Fukushi and T. Suzuki. *Tohoku J. Exp. Med.* 104(2):199-200, 1971.

8096 SCANNING ELECTRON MICROSCOPIC STUDIES ON MESOTHELIAL CELLS IN EXPERIMENTAL

PERITONITIS. (Ger.) Forteza Vila, J. (U. Ulm Biol. Ctr., Germany), W. Mohr, T. Ricker and G. Beneke. *Virchows Arch.* [*Zellpathol.*] 8(3):225-229, 1971.

8097 HISTOCHEMICAL AND ULTRASTRUCTURAL STUDY OF ACID PHOSPHATASE, ALKALINE PHOSPHATASE, AND ADENOSINE TRIPHOSPHATASE CONTENTS IN THE PARS PROVENTRICULARIS EPITHELIUM OF THE HORSE STOMACH. (Ger.) Schnorr, B. (Justus Liebig U. Inst. Vet. Anat., Giessen, Germany) and K. H. Wille. *Z. Zellforsch. Mikrosk. Anat.* 114(4): 482-492, 1971.

8098 SOME QUANTITATIVE DATA REGARDING THE NUCLEOLI IN CELL NUCLEI FROM RAT LIVER OF DIFFERENT PLOIDY CLASSES. (E.) Meinders Groeneveld, J. (U. Amsterdam Histol. Lab.) and J. James. *Z. Zellforsch. Mikrosk. Anat.* 114(2): 165-174, 1971.

8099 DELINEATION OF THE CANINE GASTRIC ANTRUM WITH pH PROBE AND DYE INDICATOR. (E.) Schneider, R. L. (Howard U. Coll. Med., Washington, D. C.), E. B. Chung, B. Syphax and L. D. Leffall, Jr. *J. Natl. Med. Assoc.* 63(3): 202-204 & 209, 1971.

8100 STRUCTURE AND VASCULARIZATION OF THE PORTAL VEIN IN SOME LABORATORY ANIMALS. (Bul.) Hristova, M. *Eksp. Med. Morfol.* 10(1): 18-21, 1971.

8101 A STABILIZING INFLUENCE OF POSTMICROSOMAL SUPERNATANT FLUID ON LIVER POLYMICROSOMES. (Bul.) Angelov, E. C. *Eksp. Med. Morfol.* 10(1):45-49, 1971.

8102 ISOLATION OF A PROTEIN FRACTION FROM RAT LIVER RIBOSOMES INITIATING POLYPHENYLALANINE SYNTHESIS AT LOW Mg2+ IONS CONCENTRATIONS. (E.) Grummt, F. (German Acad. Sci. Inst. Cell Physiol., Berlin) and H. Bielka. *Eur. J. Biochem.* 21(2):210-216, 1971.

8103 PHOTOMETRIC DETERMINATION OF GLYCOGEN IN STAINED LIVER SECTIONS. A METHODOLOGICAL STUDY. (E.) Sandstrom, B. (U. Uppsala Dept. Human Anat., Sweden). *Histochemie* 25(1): 15-20, 1971.

8104 ULTRASTRUCTURE OF THE GASTRIC MYENTERIC PLEXUS. (Fr.) Gabella, G. (U. Turin Inst. Anat., Italy) and G. Fornari. *C.R. Assoc. Anat. (Paris)* 146:496-504, 1971.

8105 HISTOCHEMISTRY OF LIPIDS IN THE MAMMALIAN PANCREAS. (Fr.) Gospodinov, C. (Sch. Med., Sofia, Bulgaria) and P. Petkov. *C.R. Assoc. Anat.* 146:511-513, 1971.

8106 A STUDY ON THE LYMPHATIC APPARATUS IN THE PANCREAS OF MACACA CYCLOPIS, WITH SPECIAL REFERENCE TO DEVELOPMENT. (E.) Tsai, H. K. (Natl. Taiwan U. Coll. Med., Taipei). *Okajimas Folia Anat. Jap.* 47(6):433-443, 1971.

8107 THE HISTOLOGICAL STRUCTURE OF STOMACH IN BAT (RHINOFOME KINNEARI). (E.) Swarup, B. (Jawaharlal Nehru Med. Coll., Aligarh, India), D. Kumar and B. N. Sinha. *Indian J. Med. Res.* 59(2):259-264, 1971.

8108 INDIGOGENIC METHODS FOR GLYCOSIDASES. III. AN IMPROVED METHOD WITH 4 CI 5 Br 3 INDOLYL B D FUCOSIDE AND ITS APPLICATION IN STUDIES OF ENZYMES IN THE INTESTINE, KIDNEY AND OTHER TISSUES. (E.) Lojda, Z. (Charles U., Sch. Med., Prague) and J. Kraml. *Histochemie* 25(3):195-207, 1971.

8109 HISTOCHEMISTRY OF THE LIPIDS IN THE PANCREAS OF GUINEA PIG. (E.) Petkov, P. (Med. Sch., Sofia, Bulgaria), C. Gospodinov, I. Izmirov and S. Donev. *Acta Histochem. (Jena)* 39(2):185-194, 1971.

8110 CYTOCHEMICAL STUDIES ON THE APPEARANCE OF LYSOSOMAL ENZYMES IN UNUSUAL STRUCTURES OF RAT LIVER CELLS. (E.) Krzyzowska Gruca, S. (Inst. Oncol., Gliwice, Poland), S. Gruca and A. Vorbrodt. *Acta Histochem. (Jena)* 40(1): 98-107, 1971.

8111 DISTRIBUTION OF CADMIUM AMONG PROTEIN FRACTIONS OF MOUSE LIVER. (E.) Nordberg, G. F. (Karolinska Inst., Stockholm), M. Piscator and B. Lind. *Acta Pharmacol. Toxicol. (Kbh.)* 29(5-6):456-470, 1971.

See also number: 8647

8112 INTESTINAL TRANSPORT OF AMINO ACID RESIDUES OF DIPEPTIDES. I. INFLUX OF THE GLYCINE RESIDUE OF GLYCYL-L-PROLINE ACROSS MUCOSAL BORDER. (E.) Rubino, A. (U. Naples 2nd Dept. Pediatr., Italy), M. Field and H. Schwachman. *J. Biol. Chem.* 246(11):3542-3548, 1971.

An 8-cm-long segment of rabbit ileum was used to study the *in vitro* flux of the glycine residue of (glycyl-^{14}C) glycyl-L-proline (Gly-Pro) from the intestinal lumen into mucosal cells. Using this dipeptide at concentrations of 0.05-32 mM there were seen to be 2 saturable influx processes: the first had a value for maximal influx (Vmax) of 0.59 micromole/cm^2 hr and an apparent Michaelis-Menton constant (K_t) of 0.93 mM, while the other had a Vmax of 4.03 µmoles/cm^2 hr and a Kt of 56.8 mM. Further studies of the first process revealed that the influx at 0.5 mM concentration of Gly-Pro was not affected by 20 mM glycine and was inhibited only 8% by 20 mM L-proline. Gly-Pro (20 mM) did not inhibit the influx of either 0.5 mM glycine or 0.5 mM proline. A marked inhibition of glycine influx was seen with L-methionine (Met), L-phenylalanine (Phe) and L-leucine, while little or no effect on Gly (Gly-Pro) influx was seen with these single amino acids. Gly(Gly-Pro) influx was markedly inhibited by Met-Pro and Phe-Pro, both of which had little effect on glycine influx. Only those peptides which lacked a free amino group in the α-position failed to inhibit Gly (Gly-Pro) influx. Absence of Na$^+$ in the mucosal medium inhibited Gly(Gly-Pro) influx by reducing Vmax and inhibited glycine influx by increasing Kt. Influx of Gly Gly-Pro was reduced by loading tissues with 50 mM of glycine or Gly-Pro, but not inhibited by preloading with 50 mM of proline, leucine or D-glucose.

8113 METABOLISM AND TRANSPORT OF BILE SALTS IN THE INTESTINE. (E.) Tyor, M. P. (Duke U. Med. Ctr., Durham, N. C.), J. T. Garbutt and L. Lack. *Am. J. Med.* 51(5):614-626, 1971.

A study of 17 cholanic acid derivatives, not all naturally occurring, indicated that hydroxylation of the bile salt was not necessary for active transport across the ileum. The presence of a single negative charge was necessary and a charge interaction with Na$^+$ (a requirement for active transport) was postulated as a mechanism. A single system involving one area is postulated for all bile salts because mutual inhibition followed kinetic behavior consistent with competition. The maximal rate and exclusion of the system seemed dependent on saturation or on a toxic effect on the penetrating mechanism. An additional 15% of unconjugated bile salt reabsorption takes place by passive processes primarily involving the colon. Mechanisms of passive transport were reviewed, and included lipid solubility, pH, pK of bile acids and membrane differences in ion concentration. Some species variation was noted. The absorption of unconjugated bile salts is dependent on microorganisms capable of decomposing bile salts, and involved regions other than the ileum.

8114 INTESTINAL TRANSPORT OF WATER AND ELECTROLYTES DURING EXTRACELLUAAR VOLUME EXPANSION IN DOGS. (E.) Higgins, J. T., Jr. (Indiana U. Sch. Med., Indianapolis) and N. P. Bair. *J. Clin. Invest.* 50(12):2569-2579, 1971.

In vivo perfusion of segments of duodenum, jejunum or ileum was performed in mongrel dogs under conditions of expansion of the extracellular volume. With i.v. saline loading, there was a decrease in absorption with net secretion of salt and water into the lumen of the duodenum and jejunum. Studies of the unidirectional transport of Na$^+$ showed that the negative net flux of Na$^+$ was most probably due entirely to increased transport from the serosa to the mucosa. In dogs given 10 mg deoxycorticosterone on the evening before and the morning of the study there was no change in the observed values. The intestinal response to saline loading was not altered by hemodilution using equilibration of the blood with a saline reservoir. However, there was a negative net transport of Na$^+$, K$^+$ and water when an isotonic, iso-oncotic expansion of the extracellular space was produced by re-infusing the saline-blood mixture from this reservoir. It is concluded that expansion of the extracellular space stimulates secretion of salts and water through intercellular spaces in the small intestine.

8115 DRUG TRANSPORT V: MECHANISM OF POTASSIUM-ION INHIBITION OF PASSIVE TRANSFER OF SOLUTES ACROSS EVERTED RAT INTESTINE. (E.) Mayersohn, M. (U. Toronto Fac. Pharm., Ontario, Canada), M. Gibaldi and B. Grundhofer. *J. Pharm. Sci.* 60(12):1813-1817, 1971.

The quantitative replacement of Na$^+$ by K$^+$ in a Krebs bicarbonate buffer resulted in some degree of transfer inhibition across everted rat intestine for every compound studied (bromthymol blue, digoxin, salicylate, antipyrine and others). Generally as the clearance value (permeability of solute) increased, the percent inhibition decreased. The most permeable compounds, benzocaine, aniline and salicylamide, were inhibited the least, while poorly permeable compounds such as bromthymol blue or eosine blue had negligible transfer in the presence of potassium ion. The plot of percent inhibition versus molecular weight yielded a correlation coefficient of 0.884 and indicated that the larger the molecule, the greater the extent of transfer inhibition. When the intestine was exposed to buffer solutions (K$^+$, hypotonic, 25 mM glucose, amd 250 mM glucose) causing tissue fluid uptake, a portion of the fluid penetrates the mucosal cell, causing cellular swelling and producing a narrowing of the apical portion of the intercellular channel.

8116 GASTRIN INHIBITION OF INTESTINAL ABSORPTION IN DOGS. (E.) Bynum, T. E., E. D. Jacobson and L. R. Johnson (U. Oklahoma Med. Ctr., Oklahoma City). *Gastroenterology* 61(6):858-862, 1971.

The effects of endogenously released gastrin and exogenously infused pentagastrin on jejunal and ileal absorption of sodium, potassium, water and glucose was studied in dogs. The i.v. infusion of gastrin pentapeptide (5.0 mg/kg/hr) significantly inhibited the absorption of sodium, potassium, and water in both jejunal and ileal loops. Gastrin pentapeptide infusion inhibited the absorption of glucose from both the jejunum and ileum, however, only the changes in the ileum were statistically significant. The pentapeptide increased gastric secretion. The endogenous release of gastrin by the topical application of acetylcholine to the antral mucosa significantly inhibited the absorption of sodium, potassium, water and glucose in both jejunal and ileal loops. The instillation of acetylcholine into the stomach elicited a gastric secretory response greater than that observed after exogenous pentagastrin. The i.v. infusion of secretin (1.0 U/kg/hr) had no demonstrable effect on the absorption of any substances tested in either jejunal or ileal loops.

8117 THE EFFECT OF PARTITION OF FATTY ACID BETWEEN OIL AND MICELLES ON ITS UPTAKE BY EVERTED INTESTINAL SACS. (E.) Lee, K. Y. (U. Western Australia Dept. Physiol., Nedlands), W. J. Simmonds and N. E. Hoffman. *Biochim. Biophys. Acta* 249(2):548-555, 1971.

In everted sacs of rat jejunum, the concentration of labeled fatty acid in the isotropic phase and the rate of uptake did not change when the oil phase was increased from 0.5 to 1.5 mM triether. When most of the oleic acid and monoolein was present in a micellar phase, bile salts 4 mM or 5 mM, uptake was greatly accelerated. Addition of increasing amounts of triether led to partition of an increasing proportion of oleic acid into emulsified oil particles with a corresponding reduction in concentration of oleic acid in the micellar or isotropic phase. Oleic acid uptake was reduced in linear proportion to reduction in micellar concentration. Uptake in vitro depends on the concentration of fatty acid in the isotropic aqueous phase, and not on the concentration of bile salts per se.

8118 THE EFFECT OF HEXOSAMINES ON THE ACTIVE TRANSPORT OF SUGARS IN THE HAMSTER. (E.) Barnett, J. E. G. (U. Southampton Dept. Physiol., England), G. D. Holman, A. Ralph and K. A. Munday. *Biochim. Biophys. Acta* 249(2): 493-497, 1971.

Tissue accumulation experiments were performed using everted hamster intestinal rings. None of the sugars (D-galactose, D-mannitol) was actively accumulated, but the entry of both D-glucosamine and D-galactosamine was greater than that of D-mannitol. D-Mannosamine entry was the same as that of D-mannitol. The inhibition of D-galactose accumulation given by glucosamine, galactosamine, and mannosamine was almost identical and noncompetitive. Other substances containing the ammonium group NH_4Cl, methylammonium chloride, ethanolamine hydrochloride, hydroxylysine hydrochloride and Tris chloride gave a similar inhibition, but N-acetylglucosamine did not. Very little metabolism of either D-glucosamine or D-galactosamine into ethanol-soluble products was detected, but using the former, traces of sugar phosphates and some fructose were observed. Inhibition was probably not caused by specific interaction with the carrier protein, osmotic or metabolic effects, but may be due to non-specific alteration of membrane properties.

8119 EFFECTS OF PUROMYCIN ON THE STRUCTURE OF RAT INTESTINAL EPITHELIAL CELLS DURING FAT ABSORPTION. (E.) Friedman, H. I. (U. Virginia Sch. Med., Charlottesville) and R. R. Cardell, Jr. *J. Cell Biol.* 52(1):15-40, 1972.

The apical cytoplasm of intestinal absorptive cells from puromycin-treated animals displayed lipid droplets 15 min after fat administration. Droplets were found predominantly in the smooth endoplasmic reticulum and appeared similar, if not identical, to those described in the apical cytoplasm of intestinal cells from untreated rats fed fat for a similar period of time. The smooth endoplasmic reticulum increased in quantity and often extended from the Golgi complex to the terminal web area of the cell. In contrast, there was a marked decrease in the membranes of the rough endoplasmic reticulum and Golgi complex of the intestinal absorptive cell. Puromycin treatment caused the absorptive cell to accumulate increased quantities of lipid that were devoid of membrane during fat absorption. Continued protein synthesis by the rough endoplasmic reticulum is apparently required in order to generate Golgi membranes, and if such membranes are absent, the cell's ability to discharge chylomicra is impaired and lipid accumulates.

8120 NORMAL AND PROMOTED GI ABSORPTION OF WATER-SOLIBLE SUBSTANCES III: ABSORPTION OF ANTIBIOTICS FROM STOMACH AND INTESTINE OF THE RAT. (E.) Kreutler, C. J. (Eli Lilly Res. Labs., Indianapolis, Ind.) and W. W. Davis. *J. Pharm. Sci.* 60(12):1835-1838, 1971.

In rats with a single pyloric ligation, little or no gastric absorption of soluble antibiotics was seen, even when a surface active absorption promoter was added, unless the animal was predosed with an anticholinergic compound. Double ligation (esophagus and pylorus) markedly depressed volume and titratable acidity of the gastric contents and hence promoted absorption of cephaloridine, cephalothin and penicillin V, but the onset was slow. When the drug-promoter combination was put in the ligated intestine, blood levels of the drug were elevated to several-fold the normal levels and the rise was extremely rapid. Following the administration of antibiotics by stomach tube into the intact gastrointestinal tract, blood samples taken at 20 min, antibiotic levels with absorption promoters were increased as much as 3 times more than in those without promoter. By 40-60 min, the difference disappeared. Blood level versus time curves obtained when promoters were employed in the intact rat apparently represent a rapid but transiently promoted absorption in the duodenum-small intestine, with little contribution from promoted gastric absorption.

8121 SMALL BOWEL ABSORPTION OF URINE. (E.) Naitove, A. (Dartmouth Med. Sch., Hanover, N. H.), M. M. Kaplan, P. F. Lawrence, K. Moller, III and S. G. Weig. *Surg. Forum* 22: 364-365, 1971.

Segments of lower ileum, mid-small intestine, and upper jejunum, 10-12 cm long with their circulation intact, were isolated by ligation. Known amounts of pooled urine were introduced into each segment and withdrawn after 2 hr. The fluid content, pH, and chloride ion concentrations were more significantly different in the ileum, than in the more proximal segments. The volume loss in the ileum was greater, and the pH increased, whereas in the other segments it decreased. The absorption of chloride ion was decreased in the ileum, but increased in the other segments. On the other hand, the sodium ion and osmolar concentrations rose in each segment, and the potassium ion concentration fell, the order of magnitude being the same in each segment.

8122 THE TRANSMISSIONS OF ANTIBODIES ACROSS THE GUT OF POUCH-YOUNG MARSUPIALS. (E.) Yadav, M. (U. Malaya Sch. Biol. Sci., Kuala Lumpur). *Immunology* 21(5):839-851, 1971.

The mother *Setonix* (marsupial), immunized against Salmonella *adelaide* flagella and *Bacteriophage* ϕ x 174, transmitted anti-*S. adelaide* titers in the pouch young closely following levels present in the mother, and much lower antiphage titers. Antibodies were present in the blood of pouch-young quokka aged 95 days within 15-60 min of gavage of immune serum. In *Setonix* the capacity to absorb antibodies in the intestine was lost at an age between 170 and 200 days and in *Trichosurus* (marsupial) it was lost at an age between 98 and 145 days; at these times the pouch young were able to leave the marsupium for varying lengths of time. Antibodies did not traverse the rumen wall in a young *Setonix* whose rumen was isolated from the intestine with ligatures before immune system was gavaged. Sucrose density gradient showed that 19S antibodies were not transmitted across the gut of young quokkas in detectable amounts but 7S antibodies passed rapidly. Antibody activity in milk whey and in serum of pouch-young, of Seonix and *Macropus eugenii* (marsupial) was in the 7S region only.

8123 CIRCULATION AND INTESTINAL ABSORPTION. (Rev.) (Ger.) Winne, D. (U. Tubingen Pharmacol. Inst., Germany). *Z. Gastroenterol.* 9(6):429-441, 1971.

A review of experimental and theoretical results about the influence of blood flow on intestinal absorption. (64 references)

8124 ON THE MECHANISMS OF WATER ABSORPTION IN THE RAT COLON. (E.) Lang, R. (U. Oslo Inst. Marine Biol., Norway) and H. Staaland. *Comp. Biochem. Physiol.* 40(3A):823-831, 1971.

Norway rats given food and water as well as rats deprived of either food or water, had a dry-substance content of about 30% in the most proximal part of colon tissue. This value decreased to about 23% in the more distal parts of the colon. In contrast, the amount of dry substance in the proximal colon tissue was very similar to that in the distal colon in rats etherized prior to sacrifice, indicating susceptibility to variations is a result of still undefined stimuli. Variations were also seen in frightened rats and in tissue slices after *in vitro* incubation in solutions isosmotic to blood. High molecular weight substances such as proteins may be responsible for the postulated high osmolality of the proximal part of the colon. The function of the varying osmolality of proximal colon tissue may be associated with facultative water absorption.

8125 UPTAKE OF RAT GASTRIC-JUICE-BOUND VITAMIN B_{12} BY INTESTINAL BRUSH BORDERS ISOLATED FROM BLIND-LOOP RATS. (E.) Schjönsby, H. (Haukeland Hosp., Bergen, Norway) and S. Tabaqchali. *Scand. J. Gastroenterol.* 6(6): 515-521, 1971.

The uptake of rat gastric-juice-bound ^{57}Co-labeled cyanocobalamin by brush borders isolated from small intestinal epithelial cells of rats with a blind jejunal segment was measured. There was a significant increase in the urinary indican and the fecal fat excretion in blind-loop rats compared with controls. The mean absorption of $^{57}CoB_{12}$ was 29.9% in control and 19.1% in blind-loop rats. Rat intrinsic factor (IF) preparations markedly enhanced the uptake of $^{57}CoB_{12}$ by mid-intestinal brush borders, but had only a slight effect on the uptake of $^{57}CoB_{12}$ by pooled proximal and distal brush borders. Rat gastric juice enhanced vitamin B_{12} uptake by brush borders from control rats, blind-loop rats with normal B_{12} absorption and blind-loop rats with low B_{12} absorption, with no appreciable difference between groups. Thus, the enterocyte of the blind-loop rat seems to absorb vitamin B_{12} in normal amounts.

8126 POTASSIUM TRANSPORT IN THE HUMAN SMALL BOWEL. (E.) Turnberg, L. A. (Manchester Roy. Infirm., England). *Gut* 12(10):811-818, 1971.

Factors influencing potassium transport in the small intestine were studied in normal subjects and in 4 subjects who had undergone an ileostomy for Crohn's disease of the large intestine or ulcerative colitis. In the jejunum a linear relationship was observed between the mean luminal potassium concentration and net potassium transport rate. At a constant potassium concentration water movement had a marked influence on potassium transport, indicating that solvent drag is an important force in the massive transport of potassium in the jejunum. Jejunal potassium absorption was unaffected by alterations in the luminal calcium concentration. In the 4 patients with ileostomies, a linear relationship between the potassium concentration and ileal transport rate was observed, indicating absorption by passive forces. As the luminal sodium concentration was lowered from 124.4 to 27.4 mEq/l, potassium absorption increased from 0.21 to 0.42 mEq/hr, possibly due to an increase in the electrical potential. Thus, the small intestine appears to be passive in the absorption of potassium.

8127 THE EFFECT OF OROTIC ACID ON THE ABSORPTION, TRANSPORT AND TISSUE DISTRIBUTION OF α-TOCOPHEROL IN THE RAT. (E.) Davies, T. (U. Leeds Dept. Med., England), C. L. Smith and M. S. Losowsky. *Int. J. Vitamin Nutr. Res.* 41(3):360-367, 1971.

The effect of orotic acid on the absorption and subsequent tissue distribution of ^3H α-tocopherol was determined in the rat. Orotic acid decreases plasma low density lipoproteins in the rat which results in fatty liver due to impaired release. Vitamin E is transported bound to these lipoproteins and thus tissue distribution should be affected by orotic acid treatment. This study suggests that the absorption of tocopherol was unaffected by orotic acid but that after 7 days gross differences in tissue levels of tritium-labeled α-tocopherol were observed. Orotic acid-treated animals accumulated fat in the liver with low levels of blood lipids. High levels of radioactivity in the liver and adipose tissue indicated α-tocopherol deposition in both controls and treated animals. Low levels of radioactivity were noted in the heart and kidneys of orotic acid-treated rats, thus suggesting a retransport mechanism from the liver. It appears likely that normal lipoprotein transport is necessary for utilization of absorbed α-tocopherol.

8128 CONCENTRATING FUNCTION OF THE GALLBLADDER. (E.) Wheeler, H. O. (U. California Sch. Med., San Diego). *Am. J. Med.* 51(5):588-595, 1971.

The teleological importance of the intermittency of bile entry into the bowel is debatable with respect to optimal efficiency for fat digestion, as witnessed by the presence of a gallbladder in fish and its absence in the elephant, rhinoceros, and whale. The major effect of the gallbladder on bile composition is the removal of water and inorganic electrolytes with a resulting increase in the larger organic solutes. The resulting product is a solution extremely high in bile acid and sodium, high in potassium and calcium, and low in chloride and bicarbonate concentration. Sodium ions are not bound to the bile acid micelles and a neutral salt transport system is specific in its requirement for sodium ions. A period of 3 or 4 hr is sufficient for near maximum concentration with the ability to divert the entire bile acid pool into the gallbladder. Lipid-soluble molecules are absorbed, and may alter the bile composition. Significant alteration of biliary lipid, unconjugated bilirubin, glycine-conjugated or bacterial-deconjugated bile acids may be noted by this absorption. Conjugation of a number of compounds may render them more water-soluble and prevent their reabsorption.

8129 EMPTYING AND ABSORPTION OF CAFFEINE FROM THE HUMAN STOMACH. (E.) Chvasta, T. E. and A. R. Cooke (VA Hosp., Iowa City, Iowa). *Gastroenterology* 61(6):838-843, 1971.

The effect of caffeine on gastric emptying, the extent of caffeine absorption from the human stomach, and the relationship between pH and gastric absorption of caffeine were studied in 10 healthy volunteers. The volumes of original test meals left in the stomach followed an exponential relationship with time for the water and for the caffeine meals. Approximately 83% of the test meal had emptied from the stomach at 20 min in 5 subjects and had completely emptied in 1. The rates of emptying of the water and caffeine meals were not significantly different. In the freely emptying stomach, a significant linear correlation was found between the percentage of caffeine absorbed and time. The percentage of absorption of caffeine at 20 min increased significantly with increasing pH of the test meals up to pH 7.0. The mean gastric output in response to caffeine meals was greater than that in response to the water meals at the 15-min intervals. The percentage of absorption of caffeine calculated by the volume past the pylorus method was midway between the maximal and minimal limits of absorption.

8130 REDUCTION OF LEAD ABSORPTION FROM THE INTESTINE IN NEWBORN RATS. (E.) Kostial, K. (Yugoslav Acad. Sci. Arts Inst. Med. Res., Zagreb), I. Šimonović and M. Pišonić. *Environ. Res.* 4(4):360-363, 1971.

Radioactive lead absorption from the intestines of 5- to 7-day-old rats was measured to determine the effects of calcium, phosphate, and alginate additives on this absorption. The rats were divided into 3 groups and were fed for 8 hr on Cow's milk to which 2 μCi of ^{203}Pb had been added. Calcium, Phosphorus, and alginate varied as follows: Group I 140 mg Ca, 95 mg P/100 ml; Group II 400 mg Ca, 230 mg P/100 ml (a rat level supplement); Group III 400 mg Ca, 230 mg P/100 ml and 2 gm sodium alginate/100 ml. Some experiments used ^{47}Ca in dosage 1 μCi P/animal. The animals were then returned to their mother and sacrificed at 90 hr. Results are recorded to the nearest whole number and expressed as percentage of the oral dose retained. Whole body counts were performed with and without the intestine since the feces represents the main route of excretion of the lead. Group I retained 82% ^{203}Pb and 79% ^{47}Ca with the intestine compared with 73% ^{203}Pb amd 78% ^{47}Ca without. Group II with the intestines retained 62% ^{203}Pb and 79% ^{47}Ca; without 55% ^{203}Pb and 75% ^{47}Ca. Group III with the intestines retained 35% ^{203}P and 62% ^{47}Ca; without 25% ^{203}P and 65% ^{47}Ca. Lead content of kidneys was lower than that of the liver, a reverse of what is seen in the adult.

8131 INTESTINAL TRANSFER OF CHOLINE IN RAT AND HAMSTER. (E.) Sanford, P. A. (Univ. Dept. Physiol., Sheffield, England) and D. H. Smyth. *J. Physiol. (Lond.)* 215(3):769-788, 1971.

8132 THE EFFECT OF ACCLIMATION TEMPERATURE ON AMINO ACID TRANSPORT IN THE GOLDFISH INTESTINE. (E.) Kitchin, S. E. (U. Southampton Dept. Physiol. Biochem., England) and D. Morris. *Comp. Biochem. Physiol.* 40(2A):431-443, 1971.

8133 ALIMENTATION DEPENDENT MODIFICATIONS OF INTESTINAL ABSORPTION OF SODIUM AND WATER. (Ger.) Scharrer, E. (U. Munich Inst. Anim. Physiol., Germany), J. Lutz and E. Boehnecke. *Ernahr. Umsch.* 18(6):248-250, 1971.

8134 IMPAIRMENT OF GLYCINE ABSORPTION BY GLUCOSE AND GALACTOSE IN MAN. (E.) Cook, G. C. (U. Zambia Dept. Med., Lusaka). *J. Physiol. (Lond.)* 217(1):61-70, 1971.

8135 INTESTINAL PHASE OF PROTEIN METABOLISM IN THE NEWBORN IMMEDIATELY AFTER BIRTH. REVIEW. (Sp.) Pena, J. (Univ. Pediatr. Clin., Santiago de Compostela, Spain), R. Tojo and A. Nestal. *Rev. Esp. Pediatr.* 27(158):129-166, 1971.

See also numbers: 8089, 8293, 8389, 8940

8136 THE OESOPHAGUS. (E.) Edwards, D. A. W. (Univ. Coll. Hosp. Med. Sch., London). *Gut* 12(11):948-956, 1971.

A progress report on the physiology and pharmacology of the cardiac sphincter and intraabdominal esophagus in healthy and diseased individuals is presented. Sphincteric pressure recorded by continuously perfused open tubes is less than normal in most people with symptoms of reflux, and a normal sphincter responds to the challenge of an increase in intragastric pressure by increasing its contraction by an amount which is greater than the challenge. Circular fibers of the sphincter are extraordinarily sensitive to gastrin and perhaps also to secretin and other enterogastrones. Physiological variations in sphincter pressure may include a reduction to levels at which reflux might be expected to occur. Relationships between symptoms of reflux and type of food and time after eating, together with certain postures, may plausibly be explained by changes in the closing pressure. Hiatal herniation must now be dissociated from reflux as both have their causes, effects and treatment and only occasionally are the 2 interrelated.

8137 THE EFFECT OF SELECTIVE PROXIMAL VAGOTOMY AND PYLOROPLASTY ON GASTRIC SECRETION AND MOTILITY IN THE DOG. (E.) Klempa, I. (Univ. Surg. Polyclin., Munich, Germany), F. Holle, W. Brückner, K. H. Welsch, H. Händle and A. von Wolff. *Arch. Surg.* 103(6):713-719, 1971.

The motility of the antrum in dogs with selective gastric vagotomy became impaired the more the vagal denervation was extended from cranial to caudal. There was a marked increase of food-stimulated secretion in dogs with Heidenhain pouches, in procedures without pyloroplasty compared to those with pyloroplasty. Acid secretion increased the more the vagal denervation progressed cranially to caudally as the emptying process of the stomach was hindered. The above effect could be eliminated by an additional well-functioning drainage procedure. A form of vagotomy is needed which reduces the vagally-stimulated secretion but which does not change the motility of the antrum.

8138 THE EFFECTS OF PENTAGASTRIN ON THE MOTILITY OF RUMINANT STOMACH. (E.) Ruckebusch, Y. (Natl. Vet. Sch., Toulouse, France). *Experientia* 27(10):1185-1186, 1971.

In a young bull and a cow, the i.v. injection of pentagastrin (0.5 - 2.0 μg/kg) was followed within 20 sec by a cessation of contractions of the rumino-reticulum and the electrical activity of the dorsal sac of the rumen; the electrical activity reappeared after about 10 min and the contractions after 20 min. In contrast, the omasum contracted vigorously 20 sec after the injection. After injecting pentagastrin (1 μg/kg), electrical activity in the reticulum and abomasum in the sheep ceased altogether, while the activity of the omasal wall was greatly augmented and became continuous. In all 3 animals, pentagastrin greatly increased the activity of the omasal wall, but only slightly affected the leaves, and the increased electrical activity paralleled the increase in omasal pressure. Unlike other smooth muscle excitants or cholinomimetic drugs with a nicotinic action, excitation of the omasum was accompanied by cessation of rumino-reticular activity; and unlike parasympathomimetic effects, the contraction of the omasum could be produced after atropinization of the organ.

8139 CONDITIONED FEEDING AND ELECTRICAL ACTIVITY OF THE INTESTINE IN THE RABBIT. (Fr.) Ruckebusch, Y. (Natl. Vet. Sch., Toulouse, France), M.-L. Grivel and M.-J. Fargeas. *Physiol. Behav.* 6(4):359-365, 1971.

In conditioned rabbits, feeding induced a marked increase of the frequency and intensity of short bursts of electrical potential which were superimposed on the rhythmic slow waves recorded in the pylorus, duodenum, ileum and cecum. Postprandial persistence of the phenomenon was directly proportional to the amount of food ingested. Exposure of the animals to the conditioning stimulus alone induced a similar response in the pylorus, duodenum and proximal region of the small intestine, but not in the cecum or ileum, although the rhythm of slow waves in the ileum was increased markedly. This response was abolished in vagotomized animals and in males which were placed in a stimulus box usually reserved for females. It was concluded that the experiment confirmed the psychic origin of the response to the stimulus alone.

8140 GASTRIC MOTILITY AND PERISTALSIS AFTER THORACOSCOPIC VAGOSYMPATHICOSPLANCHNICOTOMY. (Ger.) Maurer, H.-J. (U. Dusseldorf Inst. Med. Radiol., Germany) and W. Randau. *Bruns Beitr. Klin. Chir.* 218(8):687-697, 1971.

Among 15 patients, aged 23-62 yr and undergoing bilateral (8 of 15) or unilateral surgery (as above), no significant deceleration of gastric peristalsis could be demonstrated postoperatively and a transient, limited diminution of gastric tonus was seen in only 3 of 15. There was no indication of pylorospasm or any other disturbance of pyloric function. The advantages of the technique are discussed in detail.

8141 THE ANTIPERISTALTIC SEGMENT OF THE SMALL INTESTINE. (E.) Holstvoogd, L. (Burger Hosp., Amsterdam). *Arch. Chir. Neerl.* 23(3):197-204, 1971.

In view of the dilatation and muscular hypertrophy around the proximal anastomosis of an inverted loop of canine small intestine, the pressure in the intestine here regularly probably rises to very high levels. Apparently this pressure increase induced in an isolated small intestinal loop exerts the same effect on the rate of transit through the digestive tract as occurs after the inversion of an intestinal loop. This effect consists of a reduction in the rate of transit through the small intestine and a lengthening of the gastric emptying time. Kymograms showed that the passage was slowed down as a consequence of reduced motor activity and tone in the proximal portion of the small intestine. Thus this deceleration of transit that occurs after inversion of a loop of small intestine may be due to an increase of the pressure adjacent to the proximal anastomosis.

8142 ADRENERGIC INNERVATION OF SPHINCTERIC AND NONSPHINCTERIC SMOOTH MUSCLE IN THE RAT INTESTINE. (E.) Gillespie, J. S. (Glasgow U. Roy. Infirm., Scotland) and J. D. Maxwell. *J. Histochem. Cytochem.* 19(11):676-681, 1971.

The variations in the density of adrenergic innervation of the smooth muscle at different levels of the gastrointestinal tract were studied in rats using a modification of the Falck and Hillarp fluorescence technique. The majority of adrenergic fibers ended around ganglion cells in Auerbach's plexus in all regions. At the junction of the pylorus and duodenum a thickened region of circular smooth muscle, triangular in outline, was found with a dense adrenergic innervation localized to a circular band about 1 mm broad and confined to the pyloric side of the junction. No evidence of a special adrenergic innervation was found in the esophagogastric or ileocecal regions. The anococcygeus muscle, found to form an incomplete muscular ring around the terminal colon, had the highest density of adrenergic innervation of all areas studied. In the gut proper, the lowest density of adrenergic innervation was found in the lower esophagus and the highest in the duodenum with some evidence of a decreasing gradient from duodenum to colon. At the pyloric sphincter and in the circular muscle in the anal region the density increased, but did not approach the density observed in the anococcygeus muscle.

8143 THE EFFECT OF STIMULATION OF α- AND β-ADRENERGIC RECEPTORS IN THE ISOLATED RAT JEJUNUM. (E.) Minamidate, A. (Fukushima Med. Coll., Japan). *Jap. J. Pharmacol.* 21(4):439-446, 1971.

The nature of the adrenergic receptor mechanism in rat jejunum in vitro was investigated using epinephrine, isoproterenol, and phenylephrine as agonists, and dibenamine, propranolol, D,1,4-(2-hydroxy-3-isopropylaminopropoxy)-indole (LB 46), and D(-) and L(+) isomers of N-isopropyl-p-nitrophenylethanolamine hydrochloride (D-) and L(+) INPEA) as antagonists. Isoproterenol and epinephrine caused a relaxation of the isolated rat jejunum. It was occasionally observed that during epinephrine induced relaxation the tone increased slightly, then decreased again. Phenylephrine caused a relaxation followed by contraction in most experiments. The contractions induced by phenylephrine may be due to serotonin receptor stimulation. The presence of dibenamine did not reduce the relaxation induced by epinephrine or isoproterenol but it almost completely blocked the response to phenylephrine. A relaxation followed by a contraction was produced by epinephrine after prior treatment with propranolol, LB-46 or D(-) INPEA; L(+) INPEA did not affect the response to epinephrine or isoproterenol. The effects of β-adrenergic blocking agents on the response to phenylephrine was not consistent; L(+) INPEA slightly inhibited the relaxation phase of the phenylephrine response. Results indicate that α-adrenergic receptors produce relaxation followed by contraction; β-adrenergic receptors produce relaxation in the rat jejunum.

8144 THE PATHOPHYSIOLOGY OF GASTRODUODENAL MOTILITY. (Fr.) Anonymous. *Med. Hyg. (Geneve)* 29(948):149-159, 1971.

8145 THE PROBLEM OF EFFICIENCY OF THE CARDIA. (Pol.) Kowalski, W. (Milit. Hosp., Piotrkow Tryb, Poland). *Wiad. Lek.* 24(7):659-660, 1971.

8146 INHIBITION OF ELECTRICAL ACTIVITY OF THE CIRCULAR LAYER OF THE RABBIT DUODENUM IN VITRO BY STIMULATION OF THE SYMPATHETIC PERIARTERIAL FIBERS OF THE MESENTERY. (Fr.) Gonella, J. (Inst. Pharmacol. Sch. Med., Pavia, Italy) and S. Lecchini. *C.R. Acad. Sci. [D] (Paris)* 273(2):214-217, 1971.

8147 MOVEMENTS OF THE STOMACH COMPARTMENTS OF A YOUNG BULL DURING SUCKING. (E.) Kay, R. N. B. (Natl. Vet. Sch., Toulouse, France) and Y. Ruckebusch. *Br. J. Nutr.* 26(2):301-309, 1971.

8148 ELECTRICAL ACTIVITY OF THE STOMACH. (E.) Anonymous. *Br. Med. J.* 3(5775):596-597, 1971.

8149 A NEW PRINCIPLE OF ELECTRIC STIMULATION OF GASTRIC MOTOR ACTIVITY. (Rus.) Sobakin, M. A. and A. A. Skhiladze. *Med. Tekhn.* (3):15-17, 1971.

8150 CAERULEIN AND GASTROINTESTINAL MOTILITY IN MAN. (E.) Bertaccini, G. (U. Parma Dept. Pharmacol., Italy), A. Agosti and M. Impicciatore. *R.C. Rom. Gastroenterol.* 3(1):23-27, 1971.

8151 CIRCADIAN RHYTHM IN UPTAKE OF TRITIATED THYMIDINE BY KIDNEY, PAROTID, AND DUODENUM OF ISOPROTERENOL-TREATED MICE. (E.) Burns, E. R. (U. Arkansas Med. Ctr., Little Rock), L. E. Scheving and T.-H. Tsai. *Science* 175(4017): 71-73, 1972.

Inbred male BDF_1 mice were maintained on a controlled light-dark cycle (light from 0600 to 1800 hr) for 2 weeks and then received i.p. injections with saline (controls) or 7.5 mg isoproterenol at 0900, 1300, 1700, 2100, 0100 or 1500 hr; mice were sacrificed 28 hr after injection. Thirty min before sacrifice, each mouse received a s.c. injection of ^{3}H-thymidine, and samples of parotid gland, kidney and duodenum were removed, fixed and scintillation counted. Compared with controls, there was increased uptake of label by the parotid gland in isoproterenol-treated mice. There was a circadian rhythm of uptake in both controls and isoproterenol mice, with a maximal response at 28 hr. In isoproterenol mice, there was a 92% difference between highest (1300 hr) and lowest (0100 hr) levels, compared with a difference of 215% in controls (2100 and 1700 hr, resp.). The maximal kidney response was not until 34 hr. Only at 0900, 0100 and 1500 hr did the kidney uptake in isoproterenol mice exceed controls. The peak uptake was 0100 hr in controls and 0900 hr in isoproterenol mice. In both groups there was a rhythmic uptake of label by the duodenum. In isoproterenol mice, the maximum (1300 hr) differed 60% from the minimum (0100 hr) compared with a 134% change in controls (0100 and 2100 hr, resp.). Total duodenal label was significantly greater in isoproterenol mice than controls at 1300, 1700 and 2100 hr, and significantly less at 0100 hr. It is concluded that all 3 organs exhibit a circadian rhythm with respect to uptake of ^{3}H-thymidine after a single injection of isoproterenol.

8152 CONTROL OF REACTIONS RELATED TO ENZYME SECRETION IN RAT PAROTID GLAND. (E.) Selinger, Z. (Hebrew U. Jerusalem) and M. Schramm. *Ann. NY Acad. Sci.* 185:395-402, 1971.

The fusion reaction in the rat parotid gland caused by isoprenaline and monobutyryl cyclic AMP demonstrates the importance of the controlled and precisely directed fusion reaction that occurs between the secretory granule membrane and the plasma membrane facing the lumen. In view of the central role of membrane modification in enzyme secretion induced by cyclic AMP, a membrane fraction that binds the nucleotide was searched for. A postmicrosomal supernatant from rat parotid gland was found to contain protein kinase activity that was stimulated 2- to 3-fold by cyclic AMP. The dissociation constant for cyclic AMP of the crude supernatant was 3×10^{-8}M. Affinity chromatography on a cyclic AMP-sepharose column was employed in order to purify the cyclic AMP-dependent activity. The protein kinase apparently is composed of a catalytic unit and a regulatory unit that binds cyclic AMP. Presumably, the cyclic AMP binding unit was absorbed to the column. Cyclic AMP binding to specific membranes may cause in them a transformation leading to membrane fusion and discharge of exportable protein.

8153 FURTHER STUDIES OF THE PRINCIPAL GLYCOPROTEIN FROM HUMAN SALIVA. (E.) Schrager, J. (Roy Albert Edward Infirm., Lancashire, England) and M. D. G. Oates. *Arch. Oral Biol.* 16(11):1269-1279, 1971.

Individual whole salivas of 10 subjects were eluted on Bio-gel P150. Each non-retarded fraction was re-chromatographed on Ecteola-cellulose; these fractions were resolved into 2 or 3 fractions. The fractions showed virtually the same carbohydrate and amino acid composition, and did not differ from the composition of the glycoprotein before chromatography. The principal structural variability was found in the sulfate content of the fractions, the first peak, eluted with 0.05 M NaCl containing very little or no sulfate. The carbohydrate and amino acid composition of cetylpyridinium chloride precipitates of 7 individual salivas were similar to those of the non-retarded fraction eluted on Bio-gel P150 and to fractions obtained by Ecteola-cellulose chromatography. Precipitation with cetylpyridinium chloride precipitation was significantly less efficient than elution on Bio-gel P150. Variations were found in the fucose content and the additional sugar residues which were associated with blood group specificity.

8154 THE HERITABILITY OF HUMAN SALIVARY ISOAMYLASES. (E.) Wolf, R. O. (Natl. Inst. Dent. Res., Bethesda, Md.), L. L. Taylor, J. D. Niswander and J. T. Schwartz. *Arch. Oral Biol.* 16(11):1357-1359, 1971.

Zymograms were prepared from acrylamide gel electrophoresis of whole saliva samples obtained from 183 twin pairs. Concordance rates based upon the presence or absence of various bands gave no evidence of genetic control for most of the bands. In fact, in several instances there was more concordance among the dizygotic than among the monozygotic twins. One exception was the C_2 (second cathode band behind the main band) band. All monozygotic twins were concordant for this characteristic whereas several instances of discordance occurred in the dizygotic pairs. The twin data are highly suggestive of a single gene controlling the presence or absence of the C_2 band. A total of 56 individuals out of 366 exhibit the trait giving a phenotype frequency of 15.3%.

8155 HUMAN SECRETORY IMMUNOGLOBULINS - VII. CONCENTRATIONS OF PAROTID IgA AND OTHER SECRETORY PROTEINS IN RELATION TO THE RATE OF FLOW AND DURATION OF SECRETORY STIMULUS. (E.) Brandtzaeg, P. (Natl. Hosp., Oslo, Norway). *Arch. Oral. Biol.* 16(11):1295-1310, 1971.

Concentrations of parotid immunoglobulin A and other secretory proteins were measured in 8 individuals before, during and after 80 min of gustatory stimulation. Amylase secretion rate (μg/min/gland) increased upon stimulation about 16 times, lactoferrin and free secretory piece increased about 5 times and IgA about 2.5 times. Immunoglobulin A was not transmitted by the gland like the typical secretion-specific proteins. Immunoglobulins A and M glandular transfer was comparable, and could be characterized as facilitated diffusion which was highly selective when compared with the passive external transmission of IgG and albumin. Expressions such as mg/100 mg of total protein should be avoided when levels of individual salivary proteins are studied, because of differences in the influence of flow rates. Adverse effects of sample storage must be considered, particularly for IgA levels and amylase levels in unstimulated secretions.

8156 A COMPARATIVE HISTOCHEMICAL STUDY OF PEROXIDASE ACTIVITY IN THE SUBMANDIBULAR GLANDS OF FIVE MAMMALIAN SPECIES INCLUDING MAN. (E.) Carlsoo, B. (U. Umea Dept. Histol., Sweden), A. Kumlien and G. D. Bloom. *Histochemie* 26(1): 80-88, 1971.

8157 EFFECT OF DURATION OF STIMULUS ON IODIDE CONCENTRATION IN HUMAN PAROTID SALIVA. (E.) Stephen, K. W. (Western Infirm., Glasgow, Scotland), R. M. Harden and D. K. Mason. *Arch. Oral Biol.* 16(6):581-586, 1971.

8158 ELECTROPHORESIS OF PROTEINS FROM HUMAN PAROTID SALIVA. (E.) Bellavia, S. L. (Natl. U. Dept. Biol. Chem., Cordoba, Argentina). *Arch. Oral. Biol.* 16(7):751-758, 1971.

8159 BINDING OF COPPER BY HUMAN ALIMENTARY SECRETIONS. (E.) Gollan, J. L. (U. Adelaide Dept. Med., Australia), P. S. Davis and D. J. Deller. *Am. J. Clin. Nutr.* 24(9):1025-1027, 1971.

8160 THE EFFECTS OF CASTRATION ON THE ULTRASTRUCTURE AND THE IODIDE CONCENTRATING ABILITY OF MOUSE SUBMAXILLARY SALIVARY GLANDS. (E.) Rogers, A. W. (MRC Neuroendocrinol. Unit, Oxford, England) and K. Brown Grant. *J. Anat.* 109(1):51-62, 1971.

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8161 EFFECT OF VAGAL STIMULATION AND INHIBITION ON GASTRIC MUCUS AND SULFATED AMINOPOLYSACCHARIDE SECRETION. (E.) Wise, L. (Washington U. Sch. Med., St. Louis, Mo.) and W. F. Ballinger. *Ann. Surg.* 174(6):976-982, 1971.

The effect of the parasympathetic nervous system on the control of gastric mucus secretion was studied in 4 dogs prepared with innervated total gastric pouches. The peak of the maximal acid stimulatory effect to i.v. insulin occurred either 30 - 60, or 60 - 90 min following the injection. Mean blood glucose levels in the prevagotomized and vagotomized basal states dropped following insulin stimulation. Insulin-induced vagal stimulation caused a 293% rise in rate of gastric secretion and a 331% increase in acid output. Vagotomy caused a sharp fall in rate of gastric secretion and total acid output. Also, insulin no longer caused a change in the rate or acidity of gastric secretion. Mean total mucus output, total carbohydrate output, and total protein output increased by about 3- to 4-fold following insulin-induced vagal stimulation. After vagotomy, these 3 parameters fell to about 1/2 to 3/4 of their normal basal output values. In addition, the carbohydrate/protein ratio rose markedly over the basal prevagotomized state following vagotomy. Insulin-induced vagal stimulation caused a 635% rise in the total output of sulfated monosaccharides and a fall from 36 to 9% in the proportion of hyaluronidase-resistant fraction of monosaccharides. Vagotomy, however, did not change the output of sulfated monosaccharides but did change the ratio of hyaluronidase-resistant to hyaluronidase-susceptible fractions from 36 to 93%. Insulin stimulation following vagotomy did not change the quality or quantity of sulfated monosaccharide secretion. Both gastric mucus and sulfated monosaccharide secretion appear to be partially controlled by the parasympathetic nervous system and is not dependent on gastric acidity.

8162 EFFECT OF TIME, TEMPERATURE, AND PEPTIC ACTIVITY ON INTRINSIC FACTOR CONTENT OF ACID GASTRIC JUICE. (E.) Doscherholmen, A. (VA Hosp., Minneapolis, Minn.) and S. E. Silvis. *Gastroenterology* 61(6):844-849, 1971.

Using a standardized radioimmunoassay for quantitation, the intrinsic factor activity in human gastric juice stored at different temperatures for varying lengths of time was studied. At body temperature, the intrinsic factor activity in nondepepsinized acid gastric juice decreased rapidly, the average loss being 46% after 1 hr and 92% after 4 hr. After depepsinization and reacidification to the original pH, the loss in activity averaged 2 and 5% after 1 and 4 hr, resp. At room temperature, the activity deteriorated slowly over a 7-day period. When the samples of gastric juice were stored at a temperature of 1 C, the activity deteriorated very slowly (only 15% after 7 days), while storage at -20 C caused a rapid deterioration of intrinsic factor activity (99% after 7 days). When samples were frozen rapidly, stored at -70 C and thawed quickly, the loss of activity was much less than those frozen slowly and thawed slowly at room temperature (10% compared with 67.5% loss in the first day); however, no further deterioration of activity was observed after the first day. Depepsinized, reacidified samples stored at -20 C showed little loss of activity over 7 days. Thus, the loss of intrinsic factor activity at body temperature and after storage at -20 C seems to be due to the peptic activity. The storage age of gastric juice at the time of freezing influenced activity, as indicated by the observation that the loss of intrinsic factor activity was more rapid in samples of gastric juice that had been stored in an ice-water bath for 4 days than those that had been stored for 24 days.

8163 DEVELOPMENT OF GASTRIN ACTIVITY. (E.) Zelenkova, J. (Univ. Hosp., Prague) and O. Gregor. *Scand. J. Gastroenterol.* 6(7): 653-656, 1971.

No gastrin activity was found in Wistar rats immediately after birth nor during the first 21 days, during which period the young rat feeds exclusively on its mother's milk. Gastrin bioassay activity (expressed as acid output minus-basal acid output) appeared during the weaning period, when young rats were given solid food in addition to their mother's milk. Gastrin activity steadily increased in the juvenile period, during sexual maturation, and in adult life, with the exception of a decline on the 35th day. Body and stomach weight increased steadily with age. Immediately after birth and during the weaning period, acid secretion was present in the stomachs, whereas none or only some gastrin activity was detected. The lower gastrin activity at birth may explain the lack of chronic peptic ulcers in infancy.

8164 INHIBITORY MECHANISMS IN DUODENAL CONTROL OF GASTRIC ACID SECRETION. (E.) Andersson, S. (Karolinska Inst., Stockholm). *Gastroenterology* 61(5):778-781, 1971.

The mechanisms and physiological significance of duodenal inhibition of gastric secretion are reviewed. It is now generally agreed that duodenal inhibition acts through the release of 1, or possibly several, humoral agents. The physiological role of secretin in the inhibitory control of gastric acid secretion is questionable. The duodenal bulb appears to be the main site of the pH-sensitive inhibitory mechanism which can be demonstrated in both Pavlov and Heidenhain pouches, indicating a humoral mechanism of inhibition. Thus, the existence of a specific inhibitor in the duodenal bulb, called bulbogastrone, has been postulated. Konturek and Johnson may have succeeded in demonstrating a nervous inhibitory mechanism by showing that the inhibition of secretory output from a gastric fistula by acid in the duodenal bulb disappeared after surgical division of the gastroduodenal junction. The postulated enterogastric reflex and its physiological significance require further investigation.

8165 THE GASTRIC SECRETORY RESPONSE TO INSULIN: AN "ALL-OR-NONE" PHENOMENON? (E.) Spencer, J. (Roy. Postgrad. Med. Sch., London) and M. I. Grossman. *Gut* 12(11):891-896, 1971.

Two mongrel dogs were prepared with a gastric fistula and an innervated fundic pouch (Pavlov), drained at the upper and lower ends by a Gregory cannula. Baseline secretory studies were performed 3 weeks after surgery. During each test normal saline solution (154 mEq NaCl/liter) was infused into a leg vein at a rate sufficient to keep open a polyethylene venous collection cannula. In response to a single i.v. dose of histamine dihydrochloride (0.16 mg/kg/hr), the acid secretory responses were 3.01 and 6.01 mEq/hr in the 2 dogs, resp.; higher secretory rates were consistently seen in the second dog. After a single i.v. injection of regular insulin (0.06, 0.12, 0.25, 0.5 or 1.0 U/kg), there was a fairly constant delay (15-27 min) before initiation of secretion, and the duration of this delay was independent of the dose of insulin. A secretory response followed every dose of insulin, with the exception of the lowest dose in the first dog. The delay between the onset of secretion and peak secretion varied from less than 3 min (in 2 experiments with the 0.12 U/kg dose) to 51 min (in 1 experiment with the 1.0 U/kg dose). With the 1.0 U/kg dose, the timing of the peak secretion was less accurate because of a prolonged plateau of secretion. Peak acid output (μEq/6 or μEq/15 min) increased with increasing insulin dose up to 0.25 U/kg, where it plateaued. The secretory response was more prolonged with higher doses. The peak acid output (as μEq/15 min) was significantly correlated with the fall in plasma glucose when the latter was expressed as a percentage of the fasting pre-insulin level; this held for both dogs separately and together. The results are consistent with the all-or-none hypothesis for insulin-stimulated gastric acid secretion but favor the hypothesis that insulin provides a graded glycopenic stimulus producing a graded secretory response.

8166 ANTIPEPTIC ACTIVITY OF ANTACIDS. (E.) Kuruvilla, J. T. (Christian Med. Coll., Vellore, India). *Gut* 12(11):897-898, 1971.

In an in vitro experiment, pepsin activity was assayed on the basis of the photometric estimation of tyrosine which is split off from hemoglobin after incubation with pepsin. Bovine hemoglobin was adjusted to pH 2 and incubated with 0.2% swine pepsin mixture for 30 min at 37° C (controls) and was repeated with the addition of 10 times that volume of antacid. The antipeptic activity of each antacid was calculated from the formula: (x - y) X 100/x, where x is the amount of tyrosine split off the hemoglobin mixture and y is the amount of tyrosine split off the hemoglobin-antacid mixture. The percent antipeptic activity with various antacids was: bismuth aluminate, 1%; aluminum hydroxide, 2.3%; bismuth aluminum carbonate, 2.3%; magnesium trisilicate, 52%; calcium carbonate, 81%; magnesium carbonate, 82%; sodium bicarbonate, 85%; magnesium oxide, 86%.

8167 ACID AND PEPSIN SECRETION FOLLOWING PARIETAL CELL VAGOTOMY. (E.) Kaynan, A. (Mt. Sinai Sch. Med., New York, N. Y.), G. Ben-Ari, A. E. Kark and J. Rudick. *Surg. Forum* 22:297-298, 1971.

Mongrel dogs pretreated with histamine (0.25, 0.5, 1.0 and 2.0 mg/base/kg-min), pentagastrin (0.75, 1.5, 3.0 and 6.0 μg/kg-hr) or 2-deoxy-D-glucose (100 mg/kg i.v.) showed a decrease in acid responses to submaximal but not to maximal doses of histamine following parietal cell vagotomy, whereas both submaximal and maximal acid responses to pentagastrin were reduced. Similar responses were obtained with supra-diaphragmatic vagotomy but reduction in acid output was less pronounced. Significant reduction of pepsin output occurred at all levels after parietal cell and subdiaphragmatic vagotomy. A reduction but not abolishment of acid output with 2-deoxy-D-glucose was noted with parietal cell vagotomy, whereas total abolishment was induced with subdiaphragmatic vagotomy. Pepsin output stimulated by 2-deoxy-D-glucose was totally suppressed by vagotomy. Results suggest that pepsin rather than acid responses should be used as a measure of the completeness of parietal cell vagotomy.

8168 STUDIES ON GASTRIC MUCOPROTEINS. THE ISOLATION AND CHARACTERIZATION OF THE MUCOPROTEIN OF THE WATER-SOLUBLE MUCUS FROM PIG CARDIAC GASTRIC MUCOSA. (E.) Snary, D. (U. Newcastle upon Tyne Dept. Biochem., England) and A. Allen. *Biochem. J.* 123(5):845-853, 1971.

Gel filtration of the water-soluble material from mucosal scrapings of the cardiac region of pig stomach gave 3 fractions, A, B and C. Each fraction contained radioactivity from (U-^{14}C) glucose and (G-^{3}H)threonine incorporated solely into the carbohydrate and protein, resp. of the mucoprotein. The specific radioactivities of fractions A and B were the same, with fraction Ca little lower. The chemical analyses of fractions A and B revealed mucoprotein composed of hexose 28%, hexosamine 29%, fucose 10%, sialic acid 1% and protein 22%. The protein content of fraction C was higher with a corresponding decrease in the carbohydrate content. All 3 fractions had closely similar A and H blood group activities. Fractions A,B, and C were polydisperse with sedimentation velocity values of 18.7S, 4.9S and 3.9S, resp. The unfractionated water-soluble mucus contained only 2 peaks, fraction A, 18.7S, and a peak of 4.4S, which was a combination of B and C fractions. Radioactive mucoprotein accounted for 85% by weight of the soluble mucus and it consisted of 2 distinct fractions A and B-C, which were chemically, biosynthetically and immunologically very similar.

8169 POTENTIATION BETWEEN INTESTINAL AND GASTRIC PHASES OF ACID SECRETION IN HEIDENHAIN POUCHES. (E.) Curg, J. R. N., J. Isaza, E. R. Woodward and L. R. Dragstedt (U. Florida Coll. Med., Gainesville). *Arch. Surg.* 103(6):709-712, 1971.

Eight mongrel dogs had Heidenhain pouches and cannulas as well as vagus-denervated, isolated antral pouches. The combination of acetylcholine antral irrigation (gastric phase) and feeding (intestinal phase) resulted in a marked increase in acid secretion from the Heidenhain pouch in 6 dogs. This increase was sufficiently greater than the sum of that caused by individual stimulations, to suggest potentiation of the 2 mechanisms. Hypotonicity of the stomach and antral stasis with a prolonged liberation of antral gastrin during digestion may result in a prolonged acid environment and gastric ulceration. During the phase of antral stasis and prolonged gastrin release, some food will enter the small intestine with the release of intestinal gastrin which potentiates the effect of the already circulating antral gastrin. This increase would only be present after eating and would not be evident in the fasting stomach.

8170 EFFECT OF PENTAGASTRIN ON THE UTILIZATION OF ^{3}H-HISTIDINE FOR HISTAMINE FORMATION BY THE STOMACH OF THE RAT. (E.) Kowalewski, K. (U. Alberta Surg.-Med. Res. Inst., Edmonton, Canada), A. Koheil and J. C. Russell. *Can. J. Physiol. Pharmacol.* 49(11):967-971, 1971.

Total free histamine content and isotopically-labeled newly-formed histamine were determined in gastric and hepatic tissues and in the gastric juice of male rats after i.v. infusion for 24 hr at a steady rate with pentagastrin. Pentagastrin at the dose used was an adequate stimulant of gastric juice rich in hydrogen ion. Total free histamine of the stomach was elevated at the end of 24 hr infusion of pentagastrin. Gastric and hepatic tissue ^{3}H-histamine, considered as newly-formed histamine, was also higher in pentagastrin-infused rats. However, pentagastrin did not affect significantly the excretion of labeled histamine in gastric juice. The presence of histamine in gastric juice is apparently not directly related to post gastrin hyperacidity under the condition of the present experiment.

8171 PENULTIMATE ASPARTYL UNNECESSARY FOR STIMULATION OF ACID SECRETION BY GASTRIN-RELATED PEPTIDE. (E.) Trout, H. H. (VA Ctr., Los Angeles, Calif.) and M. I. Grossman. *Nature* [*New Biol.*] *(Lond.)* 234(51):256, 1971.

In conscious cats with gastric fistulas, dose response curves were established for gastric acid response to cholecystokinin, 7-ala cholecystokinin and pentagastrin. Assigning a potency of 1 to cholecystokinin, the relative molar potency of 7-ala substituted analogue was 1/110 and of pentagastrin was 1/4. An analogue of gastrin tetrapeptide in which alanyl was substituted for aspartyl showed no detectable stimulation of acid secretion at doses as high as 15 mg/kg, confirming previous negative findings in the rat. The weak action of alanyl-substituted analogues cannot readily be detected without the enhancement of potency conferred by the sulfated tyrosyl of cholecystokinin. On the assumption that gastrin and cholecystokinin act on the same site, the aspartyl residue of gastrin may be dispensable.

8172 EFFECT OF NONNUTRITIVE BULK AND FOOD DEPRIVATION ON WHEEL-RUNNING ACTIVITY OF VAGOTOMIZED RATS. (E.) Messing, R. B. and B. A. Campbell (Princeton U. Dept. Psychol., N. J.). *J. Comp. Physiol. Psychiatr.* 77(3): 403-405, 1971.

Food deprivation without access to the nonnutritive diet increased wheel running in both vagotomized and sham-operated rats. For the last 3 days, vagotomized animals ran significantly nore than shams under food deprivation. Only the vagotomized animals showed an increase in wheel running when allowed free access to the nonnutritive diet during starvation. There were also no differences in the amount of nonnutritive diet ingested by the 2 groups or in the amount of weight lost during deprivation. Apparently, stimuli arising from an empty stomach are not the source of increased wheel running during starvation. Instead stomach distention, as monitored by the vagus, acts to inhibit wheel running activity during food deprivation if the animal is allowed access to a palatable nonnutritive diet.

8173 THE EFFECT OF THE TIME OF TESTING ON THE DETERMINATION OF pH VALUES IN IN VITRO SAMPLES OF GASTRIC JUICES. (Ger.) Pöge, A. W. (Karl Marx U. Surg. Clin., Leipzig, Germany) and J. Walther. *Dtsch. Z. Verdau Stoffwechselkr.* 31(1):11-15, 1971.

Repeated determinations were made of the pH values of 602 samples of gastric juices, at intervals up to 72 hr after the samples were obtained and at holding temperatures ranging form 0° C to room temperature. The longer the sample was held, the greater was the change of pH at any temperature; the higher the holding temperature, the greater was the change of pH over any given time interval. It is concluded that reliable determinations could not be made when samples are held, at room temperature, beyond the day on which they are obtained from the patient, or when they are held beyond the following day, at temperatures of 0°-4° C.

8174 THE ROLE OF CYCLIC AMP IN GASTRIC SECRETION. (E.) Levine, R. A. (State Univ. Hosp., Syracuse, N. Y.) and D. E. Wilson. *Ann. NY Acad. Sci.* 185:363-375, 1971.

Prompt inhibition (within 15 min) of gastric secretion by cyclic AMP was demonstrated in 12 experiments performed on anesthetized dogs with Heidenhain pouches, 6 studies on anesthetized dogs with gastric fistulae, and 2 studies on an intact, conscious, trained dog. Degree of inhibition and recovery to pretreatment levels were similar whether given by single rapid injection or by continuous i.v. infusion. Epinephrine, glucagon, and cyclic inosine monophosphate all mimicked the effects of exogenous cyclic AMP. No significant alteration of basal gastric secretory rate was observed in 9 human subjects after cyclic AMP stimulation. However, cyclic AMP significantly depressed betazole-stimulated gastric acid secretion 28% during the 15-min interval after cyclic AMP injection in 9 subjects. Volume diminished and pH was unchanged. All subjects had an increase in cardiac rate and plasma glucose, and half complained of uncomfortable sick effects. The primary role of cyclic AMP may be to mobilize calcium ion, possibly the key intracellular messenger of gastric secretion from intracellular pools.

8175 PLASMA GASTRIN LEVELS IN CONSCIOUS RHESUS MONKEYS. (E.) Mullen, J. L. (U. Pennsylvania Sch. Med., Philadelphia), E. F. Rosato, F. E. Rosato, G. Lanciault and F. P. Brooks. *Surg. Forum* 22:301-302, 1971.

No correlation between the level of spontaneous acid secretion and plasma gastrin concentration was noted in fasted male Rhesus monkeys with modified Thomas cannulae in the stomach. A significant increase in plasma gastrin levels above basal concentration in vena caval blood was observed after feeding. Results suggest that circulating gastrin concentration was not the primary determinant of fasting acid secretion.

8176 NATURE OF THE GASTRIC HYPERSECRETION ASSOCIATED WITH INTESTINAL EXCLUSION. (E.) Villar, H. (U. California Sch. Med., La Jolla), A. G. Abbott, R. J. Williams, H. Rosen and M. J. Orloff. *Surg. Forum* 22:299-300, 1971.

No effect on basal acid secretion by intestinal exclusion or portacaval shunt was noted in dogs with isolated denervated fundic pouches. Only dogs with jejunal exclusion showed a significant increase in acid secretory response to an intestinal meal. Animals with exclusion and intact intestines showed significant gastric hypersecretion in response to feeding. Results suggest that the jejunum is the site of origin of an inhibitor of gastric acid production.

8177 EFFECT OF SECRETIN ON THE SERUM GASTRIN RESPONSE TO A MEAL IN MAN AND IN DOG. (E.) Bunchman, H. H., II, D. D. Reeder and J. C. Thompson. *Surg. Forum* 22:303-304, 1971.

Administration of secretin during i.v. ingestion of food caused a significant decrease in serum gastric response to food in man and dog and an almost total abolishment of Heidenhain pouch acid secretion, which returned to control levels after termination of treatment.

8178 INCREASED INTRACRANIAL PRESSURE AND GASTRIC MUCOUS PRODUCTION. (E.) DeWeese, W. O. (Louisiana State U. Sch. Med., New Orleans), J. A. O'Neill, Jr., D. G. Kline, F. C. Nance and C. M. Johnson. *Surg. Forum* 22:326-328, 1971.

Isolated antral pouches were constructed in the stomachs of 5 dogs, and cannulae were inserted for the collection of mucus secretions. After a 1-month recovery period, daily 3-hr collections of pouch mucus were made for 10 days. A small craniotomy was then performed on each animal, and a balloon catheter was inserted in the right frontoparietal epidural space and inflated to double the resting intracranial pressure, which was maintained for 2 weeks. An identical 10-day series of 3-hr pouch collections, with analyses and cortisol determinations was performed. The volume of antral mucus output diminished in all animals from 27 ml to 14 ml per 3 hr, following balloon inflation. The dry weight of the nondialyzable mucous material decreased from 138 mg to 88 mg. The concentration of nondialyzable mucosubstance, however, was not significantly different from the control level. Plasma cortisol levels increased an average of 40%. An acute duodenal ulcer was found postmortem in 1 of the dogs.

8179 EFFECTS OF CATECHOLAMINES ON ACID SECRETION OF BULLFROG ISOLATED GASTRIC MUCOSA. (E.) Thorpe, C. D. (U. Michigan Med. Sch., Ann Arbor), R. A. Frusco, P. Bass and C. C. Hug, Jr. *Surg. Forum* 22:317-319, 1971.

The stomachs of bullfrogs were removed, halved, and the stripped mucosa was mounted in paired Lucite chambers. The secretory (mucosal) and nutrient (serosal) solutions were gassed with 100% O_2, and 95% O_2--5% CO_2, resp. After 4-7 hr, the mucosae reached resting secretory rates. Half of each pair was then exposed to catecholamines for 1 hr in the presence of ascorbic acid (0.2 mg/ml), while the control halves received only ascorbic acid in the nutrient solution. In 1 group, histamine (10^{-6} M) was added to both halves. In another experiment isoproterenol (5×10^{-3}) was added alone, and in the presence of propanolol. There was no stimulation of acid secretion in the resting mucosae by epinephrine, norepinephrine or isoproterenol in concentrations ranging from 10^{-5} to 10^{-2} M. Epinephrine and norephrinephrine produced insignificant decreases in the histamine-stimulated secretory rates. However, isoproterenol (5×10^{-3} M) significantly inhibited the histamine secretory rate by 55%. In the presence of propranolol, this inhibition was decreased to 12%. At higher concentrations of isoproterenol (10^{-2} M) the inhibitory effect was not blocked by propranolol. Maximal responses to acetylcholine were inhibited 60% by isoproterenol. The inhibitory action appears to be a direct effect on the β-adrenergic receptors, independent of gastric blood flow.

8180 THE EFFECT OF SEROTONIN ON THE GASTRIC MUCOSAL BARRIER. (E.) Wise, L. (Washington U. Sch. Med., St. Louis, Mo.), L. Ashford and W. F. Ballinger. *Surg. Forum* 22:321-322, 1971.

Innervated total gastric pouches were constructed in 6 dogs. After a 3-week recovery period, the innervation of the pouches was confirmed. Control experiments were performed in each dog, in which isosmotic solutions containing HCl and NaCl were introduced into the pouches to establish the net flux of hydrogen, sodium, potassium and chloride ions. These values were compared with those found following the administration of 5-hydroxytryptamine (5-HT), or its precursor, 5-hydroxytryptophan (5-HTP). The test solutions were recovered from the pouches after 30 min. In the control experiments, and with parenterally administered 5-HT (0.03-2.0 mg/kg/15 min) there was no significant net hydrogen or sodium exchange. However, following the administration of 5-HTP (20 mg/kg i.v.), there was a highly significant decrease in hydrogen concentration from a mean of 101.2 ± 0.4 to 96.9 ± 0.4 mEq/liter. The net flux of potassium and chloride was unaffected by 5-HTP. The difference in response may be due to the fact that 5-HT remains in the extracellular spaces, whereas 5-HTP penetrates the cells, where it is converted to 5-HT.

8181 THE MECHANISMS OF ACTION OF SALICYLATES ON GASTRO ACID SECRETION *IN VITRO*.

(E.) Jorgensen, T. G. (Michael Reese Hosp., Chicago, Ill.), E. L. Kaplan and G. W. Peskin. *Surg. Forum* 22:315-316, 1971.

Sodium salicylate (1.5 x 10^{-3} M) *in vitro* reduced the basal or gastrin-stimulated secretion in gastric mucosa from *Rana pipiens* or *R. catesbiana*, whereas a higher concentration of salicylate (0.5 mg/ml) induced complete cessation of titratable acid within 15-45 min. Partial or complete inhibition of acid secretion was reversible by washing the salicylate from the bath, but if washing occurred more than 1.5 hr after total inhibition, the damage was irreversible. Theophylline (1-2 x 10^{-3} M) gave partial protection from the salicylate if added before or during inhibition of secretion. Results suggest that salicylate may act by interference with enzymatic processes related to gastric secretion.

8182 THE ROLE OF THORACIC DUCT LYMPH IN GASTRIN TRANSPORT.

(E.) Clendinnen, B. G. (U. Texas Med. Branch, Galveston), D. D. Reeder and J. C. Thompson. *Surg. Forum* 22:306-308, 1971.

No significant difference in gastric fistula acid output in the thoracic lymph of dogs, before and after continuous antral irrigation with 1% acetylcholine, or in fasted dogs and 2 patients with chronic thoracic duct fistulas, after eating, was observed. A significant increase of serum gastric levels after eating was noted in dogs and in the 2 patients. Only small amounts of gastrin appear to be transported by thoracic duct lymph.

8183 GASTRIN LEVELS IN ANEPHRIC PATIENTS.

(E.) Maxwell, J. G. (U. Utah Coll. Med., Salt Lake City), J. G. Moore, J. Dixon and L. E. Stevens. *Surg. Forum* 22:305-306, 1971.

Postcibal serum gastrin levels in 14 normal subjects were 2-5 times higher than fasting levels; 6 anephric patients had fasting levels 5-100 times the normal range; 2 of these had gastrin levels in the range of patients with Zollinger-Ellison tumors or pernicious anemia; 1 had a significant decrease after transplantation with restoration of the postcibal rise. The results support the concept of renal degradation of gastrin.

8184 THE ROLE OF CYCLIC ADENOSINE 3',5' MONOPHOSPHATE IN GASTRIC SECRETION.

(E.) Rosen, H. (U. California Sch. Med., La Jolla, Calif.), J. G. Chandler, F. Multer and M. J. Orloff. *Surg. Forum* 22:291-293, 1971.

Pentagastrin and cyclic AMP stimulated acid secretion in isolated frog gastric mucosa. Aminophylline, which potentiates the effects of cyclic AMP, caused a small rise in secretion, while N-methyl imidazole (MIA), which interferes with the effects of cyclic AMP, strongly inhibited acid secretion. MIA, when administered with pentagastrin, prevented the normal secretory response to gastrin. Basal levels of cyclic AMP in frog gastric mucosa were observed to increase after gastrin stimulation, and decrease after exposure to MIA. Results suggest that cyclic AMP participates in gastric acid production, possibly by acting as a mediator for gastrin at the target cell level.

8185 THE KINETICS OF INHIBITION BY FAT OF HISTAMINE-STIMULATED GASTRIC ACID.

(E.) Way, L. W. (U. California Sch. Med., San Francisco). *Surg. Forum* 22:295-297, 1971.

When fat was instilled through a cannula into the duodenum of mongrel dogs, acid secretion from Heidenhain pouches of the fundic mucosa was inhibited 80% at the lowest dose of i.v. histamine (0.01 mg/kg/hr) and 23% at the highest dose (0.08 mg/kg/hr). The degree of inhibition was related to the amount of fat, as well as the histamine dose, and the dose-response curve of fat-inhibited secretion was parallel to the curve of the controls. Histamine was slightly inhibited by secretin, except at the lowest histamine doses, while cholecystokinin enhanced the histamine effect. Fat appears to release an enterogastrone from the small intestine, which is distinct from secretin or cholecystokinin.

8186 DIFFERENTIAL IONIC SECRETION BY ISOLATED PARIETAL CELLS *IN VITRO*.

(E.) McDougal, W. S. (Univ. Hosps., Cleveland, Ohio) and J. J. DeCosse. *Surg. Forum* 22:289-291, 1971.

The flux of ions in layered parietal cell cultures was studied in relation to control cultures without parietal cells, which served as standards against which changes in ionic concentrations were measured. In parietal cell cultures, available Cl^- increased on the luminal side by transport of Cl^- in the luminal direction and removal of Na^+ from luminal NaCl. H+ moved in the direction of the lumen, while changes in K flux were not significant. When cells were treated with acetazolamide, Cl^- and H^+ flux continued, although at a reduced rate, suggesting that the transport of these ions continues without carbonic anhydrase activity. Lactate diffused across the interstitial membrane, but not through the luminal membrane, an effect that might be due to differential pore size. A hypothesis of gastric acid secretion suggested by this data is presented.

8187 SELECTIVE DESTRUCTION OF GASTRIC GANGLION CELLS AND ACID RESPONSE TO HISTAMINE AND MEAT. (E.) Okada, A. (U. Minnesota Health Sci. Ctr., Minneapolis), R. L. Goodale, Jr., A.-M. Carpenter and O. H. Wangensteen. *Surg. Forum* 22:294-295, 1971.

After gastric ganglion cells in dogs were selectively destroyed in the gastric fundus by perfusion with $HgCl_2$, the maximum and submaximum rates of acid output in response to histamine were reduced by 40.2% and 81.5%, resp. Beginning 5 weeks after $HgCl_2$ perfusion of isolated denervated Heidenhain pouches in the gastric antrum of dogs, there was a persistent decrease in acid secretion, with an average reduction of 49.7% to meat stimulation. Histologic examination revealed damaged ganglion cells of Auerbach's and Meissner's plexus, in contrast to normal-appearing muscle, vessels, parietal cells and chief cells. The results suggest that intramural ganglion cells are important to antral gastrin release and to gastric response to histamine.

8188 INACTIVATION OF RENNET AND BOVINE PEPSINS BY UREA. POSSIBLE APPLICATION TO QUANTIFICATION IN MIXTURE. (Fr.) Douillard, R. (CNRZ, Dept. Anim. Technol., Jouy en Josas, France). *Biochimie* 53(4):447-455, 1971.

8189 CLINICAL AND PATHOANATOMIC CHANGES IN ANIMALS FOLLOWING INSTILLATION OF GASTRIC JUICE AND DILUTED HYDROCHLORIC ACID INTO THE RESPIRATORY TRACT. (Rus.) Rafulia, V. A. and V. N. Blagodarov. *Klin. Khir.* 51(7):50-53, 1971.

8190 ENDOGASTRIC DETERMINATION OF MAXIMAL SECRETORY RESPONSE OF THE STOMACH AFTER PENTAGASTRIN. (Ger.) Kutter, D. (U. Lausanne Fac. Pharm., Switzerland) and R. Arend. *Med. Ernahrung* 12(8):182-184, 1971.

8191 THE PENTAGASTRIN TEST AS A METHOD FOR STUDYING GASTRIC SECRETION. (Rus.) Risse, E. S. *Lab. Delo* (7):405-407, 1971.

8192 THE INFLUENCE OF PENTAGASTRIN AND SECRETIN ON THE BLOOD CIRCULATION AND SECRETORY FUNCTION OF THE HUMAN GASTRIC MUCOUS MEMBRANE. (Rus.) Dampling, L. and M. Klassen. *Klin. Med. (Mosk.)* 49(6):85-89, 1971.

8193 GLUCAGON AND GASTRIC SECRETION: A STUDY ON THE MECHANISM OF ACTION. (Ger.) Miederer, S. E. (U. Bonn Polyclin., Germany) and O. Stadelmann. *Fortschr. Med.* 89(24):926-928, 1971.

8194 THE ROLE OF METHIONINE IN HYDROCHLORIC ACID SECRETION BY THE GASTRIC MUCOUS MEMBRANE. (Rus.) Epstein, J. A. and M. I. Ustimova. *Dokl. Akad. Nauk. SSSR* 198(2):465-466, 1971.

8195 HISTAMINE AND THE PARIETAL CELL. (E.) Waton, N. G. (U. Strathclyde Dept. Pharmacol., Glasgow, Scotland). *Am. J. Dig. Dis.* 16(10):921-938, 1971.

8196 TECHNIQUE OF POLAROGRAPHIC ANALYSIS OF GASTRIC JUICE. (Rus.) Mansourova, I. D., F. S. Itchad'ik and L. V. Chipilova. *Lab. Delo* (7):407-410, 1971.

See also numbers: 8078, 8080, 8083, 8137, 8230

8197 THE EFFECT OF PROLONGED PANCREATIC SECRETION ON BLOOD ACID-BASE BALANCE IN THE CONSCIOUS DOG. (E.) Fawcett, A. N. (Roy. Infirm., Leicester, England) and C. A. Newman. *Gut* 12(11):918-921, 1971.

Three dogs were fitted with Thomas cannulas in the duodenum through which the pancreatic duct was cannulated with fine polyethylene cannulas. In another dog the pancreatic juice was collected from a duodenal pouch drained by a Fawcett cannula. In each study, the dog received a loading dose of secretin (1 clinical units/kg given i.v. over 20 min) followed by an infusion of secretin (2 units/kg/hr, i.v.) giving near maximal stimulation of secretion of pancreatic bicarbonate. Arterial blood samples were taken basally and after several intervals; pancreatic juice was collected at 10-min intervals. During the first hr of secretion there was no significant alteration of plasma pH, but this fell significantly during the second hr without any further change during the third hr; the mean fall was 0.034 pH units. The plasma pCO_2 fell a mean of 4 mm Hg during the 3 hr; the fall was linear during the first 2 hr and less so during the third. During the first hr the plasma bicarbonate fell a mean of 1.2 mEq/liter, but this was not significant; a significant fall of 2.4 mEq/liter was seen by the end of the second hr, with no further significant fall; the mean overall fall was 2.8 mEq/liter. Using the pancreatic bicarbonate output and an assumed extracellular space volume, the change in the plasma bicarbonate concentration equivalent to the loss of bicarbonate in the pancreatic juice had a mean of 2.1 mEq/liter/hour. In the first hr the base excess fell significantly by a mean of 1.4 mEq/liter and in the second hr by 3.0 mEq/liter with no further change. It is concluded that measurements of blood bicarbonate or base-excess changes cannot be used to estimate pancreatic output of bicarbonate and that the acidosis caused by pancreatic secretion does not explain the changes in bicarbonate concentration seen in pancreatic juice after prolonged secretion.

8198 EFFECT OF PENTAGASTRIN ON PANCREATIC SECRETION IN MAN. (E.) Petersen, H. (Ulleval Hosp., Oslo, Norway) and A. Berstad. *Scand. J. Gastroenterol.* 6(6):483-488, 1971.

The effect of pentagastrin on the basal and secretin-stimulated pancreatic secretion of bicarbonate and enzymes was studied in 7 healthy volunteers. Pentagastrin (0.15, 0.9 and 5.4 µg/kg hr) showed no dose-dependent effect on either basal bicarbonate secretion or bicarbonate secretion stimulated by secretin (0.1 - 2.5 clinical U/kg-hr). No dose-dependent effect of either secretin or pentagastrin on the secretion of proteolytic enzymes was found during any time of the infusion, nor did pentagastrin influence the secretion of enzymes induced by various doses of secretin. Secretin alone, as well as in combination with pentagastrin, gave significantly higher enzyme outputs than pentagastrin alone during the initial and late phase of the infusion.

8199 ISOLATION AND CHARACTERIZATION OF CARBOXYPEPTIDASES A AND B FROM ACTIVATED PANCREATIC JUICE. (E.) Reeck, G. R., K. A. Walsh and H. Neurath (U. Washington Dept. Biochem., Seattle). *Biochemistry* 10(25):4690-4698, 1971.

A technique for the purification of carboxypeptidases A and B from activated pancreatic juice which utilizes affinity chromatography, and the characterization of the resulting enzymes is presented. The carboxypeptidase A which was isolated, was purely in the β form. Three forms of carboxypeptidase B were isolated, carboxypeptidase B being composed of a single chain, while carboxypeptidase B I and B II were double chain proteins. The molecular weights were determined to be 35,200 ± 1200 for carboxypeptidase BI and 36,100 ± 900 for carboxypeptidase B II, the average of all determinations of 35,700 ± 1000 being considered representative of both proteins. The amino acid compositions and enzymatic properties of all 3 carboxypeptidases seemed to be the same regardless of the number of polypeptide chains. Each portion was capable of tightly binding 1 zinc atom per molecule. Techniques for the separation and characterization of the polypeptide chains of carboxypeptidases B I and B II are also described.

8200 UNSTIMULATED SECRETION OF PROTEIN FROM RAT EXOCRINE PANCREAS CELLS. (E.) Kramer, M. F. (U. Utrecht Sch. Med., Netherlands) and C. Poort. *J. Cell Biol.* 52(1):147-158, 1972.

In nonanesthetized, fasting rats, without cannulated pancreatic duct, the secretion of radioactive protein followed a 2-phase pattern. The relatively slow rate of secretion during the first few hr after labeling in vivo started 20 min after synthesis and resulted from fortuitous contacts of young secretory granules with the apical cell membrane. In vitro, the first radioactive protein was found outside the cells between 20 and 40 min after pulse labeling; the rate of secretion was similar to that in vivo, at least during the first 4 hr after pulse labeling. The second phase begins about 7 hr after the synthesis of labeled protein, during which the greater part (20%) left the cell at a higher rate. The second mechanism consisted of an orderly movement of the mass of secretory granules towards the apical cell membrane caused by the continuous assembly of new granules; granules in contact with the cell membrane were discharged. The second mechanism was dependent on the addition of new secretory granules, since protein synthesis blockade by cycloheximide decreased the rate of this phase of secretion without interfering with the secretory process proper. Neither extensive washing of tissue slices nor atropine inhibited fasting secretion in vitro, excluding possible secretagogues as important factors in fasting secretion.

8201 INFLUENCE OF BICARBONATE-CO_2- AND GLYCODIAZINE BUFFER ON THE SECRETION OF THE ISOLATED CAT'S PANCREAS. (E.) Schulz, I. (Max Planck Inst. Biophys., Frankfurt/Main, Germany). *Pfluegers Arch.* 329(4):283-306, 1971.

Concentrations of the different buffer components (bicarbonate and glycodiazine) were varied in order to determine the rate-limiting component. Rates of bicarbonate and fluid secretion in the perfused cat were proportional to the respective concentrations of the bicarbonate anion and total bicarbonate in the perfusate. In only 2 of 9 experiments could the secretory rate of fluid and bicarbonate be varied by altering the CO_2 pressure of the perfusate. Bicarbonate CO_2 buffer could be partially replaced by glycodiazine in its ability to promote water and solute secretion. Anion concentration in the perfusate was the rate-limiting step for the enhancement of the glycodiazine and concomitant fluid secretion, whereas by increasing concentrations of the undissociated acid of this buffer, the secretory flow rate and total buffer secretion could be decreased. Rate limitation with each buffer component seems to be dependent on its concentration and permeation properties. Undissociated glycodiazine inhibited pancreatic secretion through its effects on mitochondrial energy production.

8202 HISTOCHEMICAL BEHAVIOR OF INTERMEDIARY AND EXPORTABLE ENZYMES OF THE EXOCRINE PANCREAS OF THE MOUSE IN RESPONSE TO THE INFLUENCE OF TESTOSTERONE. (Ger.) Putzke, H.-P. (Res. Inst. Gastroenterol., Rostock, Germany) and D. Tessmann. *Acta Histochem. (Jena)* 41(1):7-12, 1971.

In female mice, i.m. administration of testosterone propionate resulted in demonstrable stimulation of the exocrine pancreas, manifested as increased activity of nonspecific esterase, lipase, 5'-nucleotidase, adenosine triphosphatase, both acid and alkaline phosphatase, succinate dehydrogenase, cytochrome oxidase and glutamate dehydrogenase. This was accompanied by decreased glycerophosphate dehydrogenase activity and a moderate increase of RNA in the basal cytoplasm of acinar epithelial cells. In male mice the only response to the agent was a transitory increase of glycerophosphate dehydrogenase and a concomitant, transitory decrease of glutamate dehydrogenase.

8203 SHORT-TERM ADAPTATION OF PANCREATIC HYDROLASES TO NUTRITIONAL AND PHYSIOLOGICAL STIMULI IN ADULT RATS. (E.) Deschodt-Lanckman, M. (U. Brussels Med. Sch., Belgium), P. Robberecht, J. Camus and J. Christophe. *Biochemie* 53(6-7):789-796, 1971.

Following maintenance on a 48% carbohydrate diet, adult rats were fasted 24 hr and refed for 5 days on various diets: 4% corn oil, 67% carbohydrate, and 18% casein or 50% lipid, 18% casein and no carbohydrate. Other groups of rats underwent either simple starvation for 3-6 days or alloxan-induced diabetes. alpha-Amylase and lipase activities tripled within 5 days in the presence of starch and corn oil, resp. Their specific activities decreased to one-third of initial values when the substrates were switched. Amylase activity on 67% starch, glucose, fructose or sucrose diet did not exceed that on 48% carbohydrate meal. Amylase activity also was not induced well by galactose and lactose decreased sharply during fasting and in diabetic rats, and was always depressed on fat diets. Diabetes and 67% galactose diet increased the specific activity of lipase, the latter probably due to a reduced glucose tolerance. Starch, fructose, sucrose or 50% fat diets all stimulated lipase. Triolein and unsaturated oils yielded results greater than those with more saturated fats (tricaprylin, tristearin and lard).

8204 AN AMINO ACID SEQUENCE INVOLVING SERINE AT THE ACTIVE SITE OF KALLIKREIN DERIVED FROM SWINE PANCREAS. (Ger.) Fiedler, F. (U. Munich Inst. Clin. Chem., Germany), B. Müller and E. Werle. *Hoppe Seylers Z. Physiol. Chem.* 352(10):1463-1464, 1971.

Kallikrein derived from swine pancreas was separated into kallikrein A and kallikrein B and kallikrein B was then treated with neuraminidase, to yield an enzyme preparation suitable for electrophoresis. Following reaction with ^{32}P-labeled diisopropylfluorophosphate, separation of the protein hydrolysates of both A and B by high voltage, paper electrophoresis yielded ^{32}P-labeled peptides whose 12 mobile, radioactive bands were identical in all respects with those demonstrated after similar treatment of trypsin. They were also identical with 12 of the 13 bands reported previously in similar studies of trypsin, chymotrypsin and pancreatic peptidase E. It is concluded that the amino acid sequence, asparagine-serine-glycine, appeared to occur at the active site of both forms of kallikrein, confirming that both are closely related to the other serine proteinases which are found in the pancreas.

8205 HISTALOG AND SECRETIN EFFECTS ON SERUM ELECTROLYTES. INFLUENCE OF PANCREATECTOMY AND GASTRECTOMY. (E.) Lechin, F. (Cent. U. Venezuela Sch. Med., Caracas), A. Benshimol, B. Van der Dijs, J. M. Grüber and A. Levy. *Acta Gastroenterol. Lat. Am.* 2(1):9-18, 1970.

Intravenous Betazole (i.v.) caused a non-significant increase of HCO_3^- and a significant rise of Cl^-, while serum inorganic phosphate and potassium fell. Gastrectomy annulled these effects. In the pancreatectomy group (6), Cl^- concentration decreased. The fall of inorganic phosphate and potassium were prevented by pancreatic resection. Secretin caused a non-significant increase of bicarbonate ion, a pronounced and persistent elevation of serum chloride, a considerable decrease in inorganic phosphate and small decreases in potassium ion. Gastrectomy annulled the effect on bicarbonate and chloride, reversed the effect on phosphate and enhanced the effect on potassium. Pancreatectomy reversed the effects on bicarbonate and chloride and prevented the secretion effect on phosphate and potassium. No variations were found in the concentrations of serum sodium.

8206 A CANNULA FOR SAMPLING PANCREATIC JUICE IN THE DOG. (Por.) De Araujo Teixeira, A. M. (Sch. Med., Porto, Portugal), J. Teixeira Neto and J. Sarmento Santos. *Medico (Porto)* 60(1038):169-171, 1971.

8207 ULTRASTRUCTURE AND FUNCTION OF THE PANCREATIC ACINAR CELL. II: THE SECRETION OF ENZYME PROTEINS. (Fr.) Frexinos, J. (Purpan Hosp., Toulouse, France), R. Fedou, J. P. Pascal and A. Ribet. *Rev. Med. Toulouse* 7, Pt. 1 (6):437-450, 1971.

8208 THE SECRETORY CAPACITY OF THE PANCREAS RELATED TO AGE. I. STUDIES USING STIMULATION WITH SECRETIN. (Cz.) Bartos, V. (Charles U. Sch. Med., Hradec Kralove, Czechoslovakia) and J. Groh. *Lek. Zpr. Lek. Fak. Karlova Univ.* 16(1-2):5-13, 1971.

8209 LOCATION, UPTAKE AND TURNOVER OF CERTAIN BIOGENIC AMINES AND CORRESPONDING AMINO ACIDS IN THE EXOCRINE PANCREAS. (Sw.) Alm, P. (U. Lund Inst. Histol. Anat., Sweden). *Commun. Dept. Anat. Univ. Lund* 1:1-14, 1971.

8210 FUNCTIONAL CHARACTERISTICS AND LYSOSOMAL INTEGRITY OF THE ISOLATED PERFUSED CAT PANCREAS. (E.) Ferguson, W. W. (U. Virginia Sch. Med., Charlottesville), T. M. Glenn and A. M. Lefer. *J. Surg. Res.* 11(7):364-374, 1971.

8211 EFFECT OF CONSTRICTION OF THE INTRAHEPATIC BILE DUCTS AND FEMALE SEX HORMONES ON THE COMPOSITION OF THE BILE. (Hun.) Mester, E. (Semmelweis Med. U., Budapest), A. Fischer and J. Filsy. *Orv. Hetil.* 112(36): 2141-2143, 1971.

HEPATOBILIARY TRACT

8212 DIMETHYLNITROSAMINE: FORMATION OF MUTAGENIC COMPOUNDS BY INTERACTION WITH MOUSE LIVER MICROSOMES. (E.) Malling, H. V. (Oak Ridge Natl. Lab., Tenn.). *Mutat. Res.* 13(4):425-429, 1971.

A direct study of the mutagenicity of the metabolic breakdown products of dimethylnitrosamine was made by incubating the compound with a suspension of mouse (10-14 weeks old) liver microsomes in the presence of an indicator organism (Salmonella typhimurium, histidine requiring strains) for mutagenicity. Only the strains which revert by base-pair substitution did so after treatment with dimethylnitrosamine and liver enzymes. The induction of revertants was independent of the buffer system used, since in both Tris or Hepes buffer, 11.6 and 14.8 revertants/10^6 survivors, resp., were obtained after treatment, as compared to 0.03 revertants/10^6 survivors in the control group. Induction kinetics of mutation under these conditions was exponential, and the mutation frequency increased with approximately the 3.3 power of the treatment time. The complete system was necessary for maximum activity. Liver enzymes are able to form mutagenic compounds from dimethylnitrosamine, and they are stable enough to enter the bacterial cell and induce mutations.

8213 INSULIN-INDUCED STIMULATION OF CHOLERESIS, INVOLVING A FRACTION WITHOUT BILE SALTS, IN THE RAT. (Fr.) Roze, C. (Bichat Hosp., Paris) and D. Feldmann. *C. R. Acad. Sci.* [*D*] *(Paris)* 273(10):887-890, 1971.

The injection of insulin into rats bearing a biliary fistula induced hypercholeresis, involving primarily an electrolyte without bile salts, rich in Cl^-, only slightly less so in HCO_3^-, and containing no K^+. The Na^+ contained was hypoosmotic and insufficient to neutralize anions, creating a disequilibrium in terms of anion-cation concentration. The concentration of bicarbonates was unchanged. A considerable weight of evidence suggested that the electrolyte was not a secretion resulting from insulin-induced stimulation of the cells of the biliary pathways, but a stimulation-induced alteration of the composition of normal bile produced by the hepatocytes. The phenomenon peaked between 30-90 minutes after injection, continued to be evidenced for approximately 3.5 hours. It appeared to be independent of the hypoglycemic activity of insulin and was definitely not mediated by the vagus.

8214 LIVER UPTAKE AND CONJUGATION OF ^{14}C-BILIRUBIN IN HEALTHY HUMANS, FOLLOWING HIGH-DOSAGE, FOUR-HOUR LOADING WITH BILIRUBIN. (Ger.) Schmidt, M. (GSF Inst. Hematol., Munich, Germany) and W. Stich. *Klin. Wochenschr.* 49(21): 1183-1184, 1971.

For 4 hr after i.v. injection of ^{14}C-bilirubin, healthy subjects received continuous i.v. infusion of unconjugated bilirubin at dose levels of 62.5, 312.5 or 625 mg/hr. A significant increase of serum levels of unconjugated bilirubin plateaued at maximal values after 120 min. at the 2 lower dose levels, after 180 min. at the highest dose level, with no conjugated bilirubin demonstrable and no significant change occurring thereafter. The mean of the first half-time for hepatic uptake and conjugation of the radioactive bilirubin showed a slight, but statistically significant increase, as compared to controls, with no significant difference between the 3 experimental groups. The mean of the second half-time was significantly decreased among subjects receiving the middle dose of infused bilirubin. It was decreased, but not at a level of statistical significance, among those receiving the lowest and highest doses.

8215 DIURNAL RHYTHM IN ENDOPLASMIC RETICULUM OF RAT LIVER: ELECTRON MICROSCOPIC STUDY. (E.) Chedid, A. and V. Nair (Chicago Med. Sch., Ill.). *Science* 175(4018):176-180, 1972.

Diurnal changes in smooth and rough endoplasmic reticulum structures were compared with the diurnal changes in the hepatic microsomal enzyme hexobarbital oxidase. In normal animals there was a centroportal gradient in the distribution of smooth endoplasmic reticulum, being greater in the pericentral and midzonal areas than in the periportal zones. Hexobarbital oxidase activity was higher and smooth endoplasmic reticulum was more abundant at 10 PM than at 2 PM. Rough endoplasmic reticulum showed less variability both in distribution and diurnal changes. In blinded rats, the diurnal variation in enzyme activity was absent and no differences were noted in smooth endoplasmic reticulum between 2 PM and 10 PM. Electron microscopy of rat hepatocytes thus revealed a diurnal variation in the relative amounts of endoplasmic reticulum structures and regional differences in their distribution within the hepatic lobule.

8216 CARBOHYDRATE METABOLISM OF THE ISOLATED PERFUSED LIVER OF NORMAL AND GENETICALLY OBESE-HYPERGLYCAEMIC (ob/ob) MICE. (E.) Elliott, J. (Imperial Coll. Sci. Technol., London), D. A. Hems and A. Beloff-Chain. *Biochem. J.* 125(3):773-780, 1971.

In the isolated perfused mouse liver the rates of gluconeogenesis were 1-3 times as fast as that obtained with liver slices from male mice, particularly with lactate and pyruvate as substrates. The formation of an excess of glucose from glycogen by isolated liver from ob/ob mice presumably contributes to the maintenance of their hyperglycemia, especially as the liver is enlarged in these mice. The capacity for glycogen synthesis from glucose was enhanced in liver from obese mice starved 24 hr. The capacity for gluconeogenesis from a number of labeled substrates (lactate, alanine, acetate) was not altered in livers from fed or starved obese mice as compared to controls. The liver contributes to the hyperglycemia of the obese mice by increased glycogenolysis and the liver glycogen is maintained by synthesis from dietary glucose.

8217 REBOUND HYPERPLASIA OF REGENERATING LIVER AFTER CESSATION OF AZATHIOPRINE. (E.) van Vroonhoven, T. J. (Massachusetts Gen. Hosp., Boston) and R. A. Malt. *Surg. Forum* 22:339-340, 1971.

Hepatectomy (68%) was performed on pair-fed rats that were treated with azathioprine (30 mg/kg/day) or vehicle alone for 5 days beginning the evening before operation. The livers regained 82% of their calculated original weight 8 days after hepatectomy and the protein content remained constant in both azathioprine-treated and untreated rats. The DNA/g liver was decreased 27% in the treated rats, but it increased markedly after azathioprine was stopped. After 4 days the DNA specific activity of the treated rats was twice that of the untreated ones. RNA content decreased about 10% in 4 days after azathioprine was stopped in both groups.

8218 CHANGES IN BILE COMPOSITION AFTER TRUNCAL VAGOTOMY. (E.) Machleder, H. I. (Stanford Med. Sch., Palo Alto, Calif.). *Surg. Forum* 22:376-378, 1971.

Chronic partial biliary fistulas, draining 2 lobes of the liver, were created in 8 dogs. After 12 days, when the dogs had recovered, 3 successive 24-hr samples of bile were collected and analyzed for cholesterol, bilirubin, electrolytes, osmolality and volume. Bile salt concentrations were calculated. A transthoracic truncal vagotomy was then performed on each dog. After another 12 days, the sampling procedure was repeated. Bilirubin concentration was elevated in 6 dogs, and reduced in 2. Osmolality was increased in 6 dogs, unchanged in 1 and decreased in 1. Cholesterol was increased in 7 dogs and decreased in 1. There was a decrease in taurocholate concentration in 7 dogs and an increase in 1.

8219 THE EFFECTS OF SURGERY ON BILE SECRETION AND COMPOSITION. (E.) Herman, A. H. (Boston U. Med. Ctr., Mass.), R. N. Redinger, D. M. Small and R. H. Egdahl. *Surg. Forum* 22: 378-380, 1971.

Adult Rhesus monkeys with total biliary fistulas, or with intact enterohepatic circulation were studied. In the first 7 postoperative days, the mean bile flow and bile salt secretion in the animals with total bile fistulas was only 25% of the control values obtained after recovery. Phospholipid and cholesterol were also depressed. When the enterohepatic circulation was restored 1 week after operation, the bile flow and secretion of lipids increased, but only to half the control values. At least 3 weeks were required to restore normal values. The results indicate that surgery alone has a repressive effect on bile secretion and composition, and that previous studies of bile secretion and composition need reevaluation.

8220 EXCRETION IN DOG BILE OF GLUCOSE AND XYLOSE CONJUGATES OF BILIRUBIN. (E.) Fevery, J. (U. Leuven Rega Inst., Belgium), G. P. Van Hees, P. Leroy, F. Compernolle and K. P. M. Heirwegh. *Biochem. J.* 125(3):803-810, 1971.

By thin-layer chromatography the azopigment patterns derived from dog bile were similar in complexity to those found with human post-obstructive bile; however, the quantitative differences were quite marked. Azopigment material from canine gallbladder bile contained 10% azopigment alpha$_2$ and 30% azopigment alpha$_3$. Sugar moieties were identified by thin-layer chromatography with acidic, neutral and basic solvent systems and by anion exchange column chromatography of their boric acid complexes. Ammonia vapor treatment of purified azopigments led to azobilirubin amide formation, indicating that both pigments are ester glycosides. Emulsin (source of beta-glucosidase activity) and Mylase-P (source of beta-glucosidase and beta-xylosidase activities) enzyme studies demonstrated the beta-D configuration. Compared with the accepted conjugation with glucuronic acid as a major route of detoxication in mammals, the detection of large amounts of xylose and glucose conjugates of bilirubin in dog bile suggest that the underlying biosynthetic pathways may be important alternative routes of detoxication.

8221 MASS-SPECTROMETRIC STRUCTURE ELUCIDATION OF DOG BILE AZOPIGMENTS AS THE ACYL GLYCOSIDES OF GLUCOPYRANOSE AND XYLOPYRANOSE. (E.) Compernolle, F. (U. Leuven Rega Inst., Belgium), G. P. Van Hees, J. Fevery and K. P. M. Heirwegh. *Biochem. J.* 125(3):811-813, 1971.

Alpha$_2$- and alpha$_3$- azopigments, prepared by diazotization of dog bile with ethyl anthranilate, were shown by mass spectrometry to correspond structurally to azobilirubin beta-D-xylopyranoside and azobilirubin beta-D-glucopyranoside, resp. Molecular ions in the mass spectra of the trimethylsilyl and acetyl derivatives of the azopigments indicated the presence of a pentose- and a hexose-conjugating sugar. Ester functions linking sugars to the propionic acid side chain of azobilirubin were demonstrated by ammonolysis and the amide of azobilirubin was identified as the aglycone derivative. The sugar moieties were xylopyranose (alpha$_3$) and glucopyranose (alpha$_2$) and they were bound at C-1. The sugar hydroxyl groups were acetylated and the 1-acyl aglycone removed selectively by treatment with hydrogen bromide in acetic acid. Hydrolysis of the 1-bromo-sugar acetates followed by acetylation afforded the alpha- and beta-xylopyranose tetraacetates and alpha- and beta-glucopyranone pentaacetates; identified by mass spectrometry.

8222 THE STABILITY OF RAT LIVER RIBONUCLEIC ACID IN VIVO AFTER METHYLATION WITH METHYL METHANESULPHONATE OR DIMETHYLNITROSAMINE. (E.) McElhone, M. J. (Christie Hosp., Manchester, England), P. J. O'Connor and A. W. Craig. *Biochem. J.* 125(3):821-827, 1971.

RNA was isolated from rat liver at selected times after the i.p. injection of either [^{14}C] methyl methanesulfonate or [^{14}C] dimethylnitrosamine. The methylation of guanine at 4 hr in rat liver RNA was 0.047% after treatment with methyl methanesulfonate; the alkylation process was over 58% complete in the first 15 min after injection. Over a 7-day period, the 7-methylguanine component of the combined rRNA + tRNA was lost, with a decay half-life of 3.1 days. In rRNA the extent of alkylation at 4 hr was 0.030% of the guanine and the decay half-life for 7-methylguanine over the 14 days was 3.5 days. The half-life for the decay of 7-methylguanine was shorter than the reported biologic turnover time of rat liver RNA species. Although dimethylnitrosamine is a potent liver carcinogen, and methyl methanesulfonate is not, the rate of disappearance of 7-methylguanine from RNA was similar for both compounds. A half-life of 5 days was obtained for rRNA using (^{3}H) orotic acid and this was not affected by injecting animals with unlabelled methyl methanesulfonate at the same dosage of 50 mg/kg used in the studies of RNA methylation. Reutilization of labeled RNA degradation products results in an overestimation of the biological half-life for rRNA. Nontoxic doses of methylating agents such as methyl methanesulfonate and dimethylnitrosamine may prove to be a more effective way of accurately estimating the biologic turnover of RNA species.

8223 GLUCAGON AFFINITY ABSORBENTS: SELECTIVE BINDING OF RECEPTORS OF LIVER CELL MEMBRANES. (E.) Krug, F. (Johns Hopkins U. Sch. Med., Baltimore, Md.), B. Desbuquois and P. Cuatrecasas. *Nature* [*New Biol.*] *(Lond.)* 234(52): 268-270, 1971.

Various glucagon-agarose derivatives were tested for their ability to activate adenyl cyclase of liver membranes in vitro, and in column chromatographic experiments, to absorb membrane material with capacity to bind ^{125}I-glucagon specifically. Derivatives obtained by interposing a hydrocarbon extension between the agarose backbone and the glucagon molecule are biologically active and can be used to specifically retain liver membranes. Adsorption specificity was demonstrated by the lack of binding to columns containing unsubstituted agarose, and by diminished effectiveness of the glucagon gel after digestion with pronase. The nature of the competition between native and ^{125}I-glucagon for binding to membranes chromatographed on glucagon-agarose columns substantiates the loss of binding structures as well as the absence of free, noncovalently bound glucagon in the chromatographed samples. About 60% of glucagon-stimulated and fluoride-stimulated adenyl cyclase activity of liver membranes is lost after chromatography on a glucagon-agarose column. Since adenyl cyclase activity recovery is always higher than glucagon-binding activity recovery, at least some glucagon receptor structures of liver membranes may not be functionally coupled to activation of this enzyme system.

8224 SPECTROPHOTOMETRIC DETERMINATION OF NEUTRAL FATS IN THE HUMAN LIVER. RELATIONSHIP BETWEEN NEUTRAL FAT CONTENT AND THE BINDING OF SUDAN IV. (Ger.) Reif, W. (Senckenberg Pathol. Inst., Frankfurt am Main, Germany) and P. Grunewald. *Acta Histochem. (Jena)* 41(1):147-158, 1971.

In specimens of human liver tissue derived by autopsy, a statistically-reliable, linear correlation was demonstrable between the chemically-determined triglyceride concentration per unit of dry tissue weight and the amount of Sudan IV which was bound per unit of moist tissue weight by adsorption from a saturated solution of propyleneglycol during an incubation period of 90 min. However, the correlation between these 2 variables, both per unit of moist tissue weight, was nonlinear. In specimens with relatively low neutral fat concentrations, a second period of rapid uptake of the dye was demonstrable, after an apparent saturation point had been reached at the end of approximately 180 min. No explanation was found for this phenomenon, which did not occur in specimens with relatively high concentrations. As the size of the neutral fat droplets increased, their ability to bind Sudan IV was significantly decreased.

8225 INTRACELLULAR POTASSIUM CONCENTRATION DURING AMMONIA INTOXICATION. (E.) Albano, O. (U. Bari Sch. Med. Surg., Italy) and A. Francavilla. *Gastroenterology* 61(6):893-897, 1971.

The effect of experimental ammonia intoxication on the potassium concentration in the RBC of rats was studied. Increasing the concentration of NH$_4$Cl by i.p. injection caused a progressive decrease in the rate of K$^+$ influx into RBC. Ten min after the i.p. injection of ammonium acetate, the concentration of ammonia in the plasma increased from 0.1 mM to 2.5 mM, the intracellular concentration of ammonia being 3 times higher than that in the plasma. While no significant difference was observed between intoxicated and control rats regarding the intra-RBC Na$^+$ content, the intracellular content of K$^+$ in RBC of the intoxicated animals was significantly reduced. The intoxication occurred in 3 steps: the induction phase which lasted about 8 min from the time of ammonia injection; onset of coma between 8 and 10 min; and a regression phase from 24-60 min. RBC ATPase activity was similar in normal and intoxicated rats.

8226 LIVER DAMAGE BY PROTRACTED ETHANOL UPTAKE AND ITS REVERSIBILITY. (E.) Turchetto, E. (U. Bologna Inst. Biol. Chem., Italy), L. Cabrini, M. P. Costantino Lupi and E. Formiggini. *Experientia* 27(10):1167-1168, 1971.

The effects of the administration of various levels of alcohol (10 and 20%) to rats in their drinking water for 15 days on total hepatic lipids and phospholipids was studied. On the sixteenth day total phospholipids were significantly increased in rats receiving either 10% and 20% alcohol, when compared to controls receiving only water, and rats receiving sucrose in isocaloric amounts. Lysolecithin, sphingomyelin, phosphatidylcholine, phosphatidylethanolamine, phosphatidyl inositol, serine, and cardiolipin were greatly increased by the sixteenth day in both groups receiving alcohol. On the thirtieth day (15 days after stopping the alcohol administration), the amounts of total lipids and phospholipids were back to normal in the group receiving 10% alcohol in water, whereas in the rats receiving 20% alcohol a decrease of liver lipids is evident, but not near the normal values; phospholipids approached normal levels to a very limited extent. Thus, the biochemical damage induced by ethanol in liver phospholipids may be more severe than the accumulation of neutral fats.

8227 CHANGES IN MICROSOMAL LIPIDS OF RAT LIVER AFTER CHRONIC CARBON TETRACHLORIDE INTOXICATION. (E.) Comporti, M. (U. Pisa Inst. Gen. Pathol., Italy), G. Landucci and F. Raja. *Experientia* 27(10):1155-1156, 1971.

Rat liver microsomal lipids were analyzed by gas-liquid chromatography after chronic CCl_4 treatment to determine if acute and chronic CCl_4-induced fatty liver shared a common origin. Livers from CCl_4-treated rats were markedly enlarged, and histological examination revealed a severe cirrhosis and a massive fatty infiltration. Hepatic triglyceride concentration was markedly enhanced in the CCl_4-treated group (68.13 vs. 13.80 mg/g liver in control rats). While a clear decrease in stearic, arachidonic and docosahexaenoic acids was observed, palmitic, palmitoleic and oleic acids were increased. Phospholipids of microsomes equivalent to 1 g liver were found to contain smaller amounts of stearic, linoleic, arachidonic and docosahexaenoic acids in the rats chronically treated with CCl_4 as compared to the controls. Liver microsomal lipids of treated rats exhibited typical diene conjugation absorption of peroxidized lipids. Thus, peroxidative decomposition of lipids of the endoplasmic reticulum appears to persist after a prolonged treatment of CCl_4.

8228 EFFECT OF CERIUM ON DRUG METABOLIZING ACTIVITY IN RAT LIVER. (E.) Arvela, P. (U. Oulu Dept. Pharmacol., Finland) and N. T. Kärki. *Experientia* 27(10):1189-1190, 1971.

Grossly the livers of rats treated with cerium (2 mg/kg i.v.) showed a typical pattern of fatty degeneration by the first day after injection. In vitro studies demonstrated that both hexobarbital and N-methylaniline metabolism in liver had already decreased significantly on the first day after cerium injection. On the second day these metabolic rates declined further, and the lowest levels were reached on the third day after injection. On the third day, the cytochrome P-450 content of the liver had fallen to 53% of the control level. Both enzyme activities had completely normalized within 16 days. The fate of blood glucose was similar to that of the enzyme activities. On the second day after cerium injection, there was a sudden 252% increase in the plasma free fatty acid level which subsided on the third day and remained at the control level throughout the observation period. No significant changes were observed in the mean hepatic protein content of the cerium-treated rats.

8229 PANTOTHENIC ACID DISTRIBUTION AND PROTEIN SYNTHESIS IN THE PARTICULATE FRACTIONS OF RAT LIVER. (E.) Shinde, V. P. (Haffkine Inst., Bombay, India) and S. D. Ambegaokar. *Experientia* 27(10):1164-1165, 1971.

Rats received pantothenic acid supplements in the diet (20 mg/kg diet). The addition of calcium pantothenate to the diet resulted in a significant elevation of liver protein content over that in rats fed a pantothenate-deficient diet. The percent distribution of pantothenic acid was higher in the supernatant fraction than in nuclear and mitochondrial fractions in both the deficient and experimental groups. The supplementation of calcium pantothenate resulted in an increase in the pantothenic acid concentration in the supernatant fraction of liver from 47% (deficient rat) to 71% (experimental mate) of the total pantothenic acid content of the liver. Thus, the function of this vitamin appears confined more to the supernatant fraction of the liver than to the nuclear and mitochondrial fractions.

8230 THE FATE OF PENTAGASTRIN. (E.) Stagg, B. H., J. M. Temperley and J. H. Wyllie (Univ. Coll. Hosp. Med. Sch., London). *Gut* 12(10):825-829, 1971.

The fate of pentagastrin in the liver was studied in dogs by infusing unlabeled and labeled pentagastrin at 30 mg/kg/hr for 30 min and analyzing plasma samples. The experiments with unlabeled pentagastrin revealed that pentagastrin was inactivated by the dog liver in vivo, while those with the labeled compound proved that this inactivation was the result of both excretion and metabolism of the drug. It was possible to account for 73-106% of the administered isotope by considering radioactivity excreted in bile and urine during the experiment and that remaining in the liver and extracellular fluid at the end. Pentagastrin was excreted by the liver into the bile predominantly in the inactivated form. Thus, the liver is seemingly the major site of pentagastrin metabolism in the dog. In 2 human volunteers, biologically active pentagastrin was excreted by the human liver following a s.c. injection of the drug, indicating a fate similar to that in the dog.

8231 METABOLISM IN VITRO OF 4-^{14}C-TESTOSTERONE BY HEPATIC MICROSOMAL AND SOLUBLE FRACTIONS OF CARBON TETRACHLORIDE AND ETHIONINE INJURED RATS. (E.) Ota, M. (Iwate Med. Coll., Japan), N. Sato and K. Obara. *Endocrinol. Jap.* 18(3):227-234, 1971.

The overall metabolism in vitro of testosterone in the rat liver under normal conditions and with carbon tetrachloride (CCl_4) or ethionine injury revealed that the hydroxylation of testosterone was impaired by CCl_4 injury, but not significantly reduced by the ethionine injury. High amounts of unmetabolized testosterone were found in both types of injury, with the ethionine-injured liver having a slightly higher amount. Small amounts of hydroxytestosterone and significant reductions in the normal metabolites, 5β-androstane-3α and 17β- diol, were noted in the microsome fraction of the CCl_4-injured liver.

The lack of these end products indicates the impairment of Δ^4-5β-hydrogenase. There was no impairment of this enzyme in the ethionine-injured liver cells. This reaction was dependent on NADPH. Serum studies of the rats revealed marked SGPT levels for CCl_4 injury and slight elevation for ethionine injury; LDH was slightly elevated in both injuries; thymol turbidity was normal. Histological study revealed the presence of Sudan III- positive materials and Kupffer cell mobilization and infiltration in the injured cells. Cytochrome P-450 was decreased in both injuries with a greater decrease noted in ethionine injury.

8232 A TECHNIC FOR REPEATED BILE COLLECTIONS FROM AN INTACT ENTEROHEPATIC CIRCULATION. (E.) DenBesten, L. (U. Iowa Hosps., Iowa City). *Proc. Soc. Exp. Biol. Med.* 138(1):208-209, 1971.

A canine preparation which allows repeated sampling of bile from an intact enterohepatic circulation through a duodenal pouch is described. The duodenal pouch containing the intact Sphincter of Oddi, drains through a Gregory cannula into the duodenum opposite a Thomas cannula in the reconstituted duodenum and extends through the abdominal wall. During experiments, the screw cap is removed from the Thomas cannula and a balloon catheter is placed in the Gregory cannula for total externalization of bile. A second small tube can be placed in the cork occluding the Thomas cannula to return the bile to the duodenum after sampling. The preparation was tested by placing Gregory cannulas in the cecum and ileum of 3 animals at the time of construction of bile duct pouches and monitoring the appearance of radioactivity after instilling cholic acid 24-^{14}C through the cecum. Radioactivity was absent from ileal contents throughout the collection period in all animals with a common duct pouch.

8233 TRYPTOPHAN AVAILABILITY AS A CONTROL OF HEPATIC PYRIDINE NUCLEOTIDE CONCENTRATION IN MICE. (E.) Powanda, M. C. (US Army Med. Res. Inst. Infect. Dis., Frederick, Md.) and R. W. Wannemacher, Jr. *Biochim. Biophys. Acta* 252(2):239-245, 1971.

The effects of single i.p. injections of varying amounts of tryptophan alone, and in combination with various agents that would either raise or lower the level of oxygenase activity, on hepatic tryptophan oxidase activity add NAD concentration was studied in mice. Following a single i.p. injection of tryptophan (0-15 mg) increases were observed in the hepatic tryptophan content, tryptophan oxygenase activity, NAD$^+$, NADPH and NADH which were proportional to the dose of tryptophan. Similar results were observed in adrenalectomized mice. Injections of high doses of tryptophan (300-500 mg/kg) were followed by significant increases in the NAD$^+$/NADH ratio after 2.5 hr. Allopurinol given simultaneously with 15 mg of tryptophan brought about a 39% decrease in observable enzyme activity at 0.5 hr without markedly affecting the NAD level attained at 2.5 hr. Administration of D,L-α-methyltryptophan in amounts sufficient to double or quadruple enzyme activity resulted in only slight increases in NAD content. Thus, NAD synthesis from tryptophan appears to be regulated by substrate availability rather than by variations in tryptophan oxygenase activity.

8234 THE ROLE OF THE PLASMA MEMBRANE IN FATTY ACID UPTAKE BY RAT LIVER PARENCHYMAL CELLS. (E.) Wright, J. D. (U. Liverpool Dept. Biochem., England) and C. Green. *Biochem. J.* 123(5):837-844, 1971.

The incorporation of (^{14}C) palmitic acid into isolated rat liver parenchymal cell suspensions occurred at 40% of the rate obtained with liver slices. After 2 min, most of the glyceride ^{14}C was in phosphatidylcholine and phosphatidylethanolamine, recovered mainly in the plasma membrane fraction. Between 5 min and 2 hr, however, the (^{14}C) palmitic acid was mainly found in triglyceride, not recoverable in the plasma membrane fraction. Palmitic acid incorporation into both triglyceride and phosphatidylcholine was increased after lysophosphatidylcholine addition, maximally at 0.1 mM concentrations. After (^{14}C) palmitic acid injection, in vivo, radioactive phosphatidylcholine was transiently concentrated in the plasma membrane fraction, with a specific radioactivity 30-fold greater than that of the whole tissue. The rapid formation of phospholipids (1 min) in the plasma membrane is apparently by acylation of their lyso-derivatives. Transport of fatty acid from the plasma membrane to the cell interior may involve operation of a phosphatidylcholine/lysophosphatidylcholine-cycle in the membrane.

8235 "IN VIVO" MICROSCOPIC STUDY OF THE RESPONSE OF THE HEPATIC MICROVASCULAR SYSTEM TO CARBON TETRACHLORIDE POISONING. (E.) McClugage, S. G., Jr. (Louisiana State U. Med. Ctr., New Orleans) and R. S. McCuskey. *Microvasc. Res.* 3(4):354-360, 1971.

The effects of CCl_4 on the hepatic microvasculature and parenchyma was studied in vivo in rats to elucidate further the events that antecede cirrhosis. The first visible effects of CCl_4 on the microvasculature were observed within 2 hr. During the first 2 days the endothelium of the sinusoids became thickened and WBC adhered to the walls of the sinusoids in the centrolobular portions of the lobules. The diffuse sticking and aggregation resulted in stasis and congestion of the sinusoids and led to a reduction in the linear velocity of blood flow in the central venules as well as WBC diapedesis. Toward the end of the treatment (2 weeks), central venules were obscured by centrolobular necrosis, hemorrhage, and moderate fibrosis. Following the alterations in the microvasculature, parenchymal alterations consisting of fatty changes, hydropic degeneration, and finally necrosis were observed.

8236 HISTOCHEMICAL STUDY OF A FEW ENZYMES IN THE LIVER OF COMMON SQUIRREL, Funambulus pennanti POISONED WITH CARBON TETRACHLORIDE. (E.) Rana, S. V. S. (D. A. V. Coll. Dept. Zool., Muzaffarnagar, India) and V. P. Agrawal. *Acta Histochem. (Jena)* 41(1):125-130, 1971.

Acute intoxication of liver of the common squirrel, Funambulus pennanti, with CCl_4 resulted in centrilobular necrosis, hydropic degeneration and cirrhosis. Binucleate cells along with innumerable balloon cells developed, and some hepatic sinusoid cells appeared to have regenerated. Alkaline phosphatase and 5-nucleotidase activities increased in the intoxicated liver, while no elevation of lipase, esterase and phosphamidase was observed. A change in the distribution of the different enzymes was visualized. Alkaline phosphatase was relocated from the deeply positive peripheral zone to regenerated hepatic sinusoid cells which remained unaffected by hydropic degeneration.

8237 REGULATION OF δ-AMINOLEVULINIC ACID SYNTHETASE BY DRUGS AND STEROIDS IN VIVO AND IN ISOLATED PERFUSED RAT LIVER. (E.) Bock, K. W. (Univ. Inst. Toxicol., Tubingen, Germany), K. Krauss and W. Fröhling. *Eur. J. Biochem.* 23(2): 366-371, 1971.

δ-Aminolevulinic acid synthetase induction by drugs depends upon the nutritional state of the animal. The enzyme induction was reduced in fed as compared with starved rats receiving allylisopropylacetamide. However, after phenobarbital treatment, enzyme induction seen in starved animals, was not observed in fed rats. Cytochrome P 450 was doubled after phenobarbital treatment and decreased rapidly after allylisopropylacetamide treatment both in starved and fed animals. In the isolated liver perfused with either washed bovine RBC and Eagle minimal essential medium or with rat blood, δ-aminolevulinic acid synthetase decreased rapidly from the steady state level in vivo. Continuous dexamethasone, hydrocortisone or etiocholanolone administration could prevent the above decrease in enzyme activity. Allylisopropylacetamide could not significantly induce δ-aminolevulinic acid synthetase unless corticoids were added to the perfusion medium, suggesting that heme and, consequently, hemoprotein synthesis is controlled by corticoids or their metabolites in adult rat liver.

8238 EFFECT OF AFLATOXIN ON RAT LIVER LYSOSOMES. (E.) Pokrovsky, A. A. (Inst. Nutr., Moscow), L. V. Kravchenko and V. A. Tutelyan. *Toxicon* 10(1):25-30, 1972.

The acute effects of aflatoxin (500 mg) on the activities of rat liver acid deoxyribonuclease (DNase), arylsulfatases A and B, β-glucosidase and β-galactosidase was studied in vivo and in vitro. Three hr after toxin administration, the activity of most of the enzymes rose significantly. DNase reached 168% of the control level, and arylsulfatases A and B and β-glucuronidase, 141 and 121% resp. At 12 and 24 hr the enzyme activities continued to increase reaching maximal levels at 48 hr. The changes in enzymatic activity correlated with the morphological data, i.e. an increase in necrotic changes the first 2 days after aflatoxin treatment followed by a predominance of proliferative processes. Electron microscopic studies revealed a considerable increase in the number of lysosomes in the hepatic cells of rats poisoned with aflatoxin. Aflatoxin caused solubilization of enzymes at 48 hr after treatment, a 2-3-fold increase of soluble lysosomal enzyme activity appearing in the supernatant. Aflatoxin had a labilizing effect on lysosomal membranes, causing the release of lysosomal enzymes into the supernatant.

8239 DEGRADATION OF THYROXINE BY THE MICROSOMAL PARTICLES FROM RAT LIVER. I. CORRELATION BETWEEN THYROXINE DEGRADATION AND LIPID PEROXIDES. (E.) Nakano, M. (Gunma U. Sch. Med., Maebashi, Japan), Y. Tsutsumi and Y. Ushijima. *Biochem. Biophys. Acta* 252(2):335-337, 1971.

The preparation of microsomal particles from rat livers which catalyze thyroxine deiodination, and the role of Fe^{2+} in the deiodination system are described. The microsomal particles possessed a high thyroxine degrading activity in the presence of added Fe^{2+} or ascorbate. During the degradation of thyroxine, a considerable amount of the material which reacts with 2-thiobarbituric acid to give a colored product was formed. As the concentration of ferrous ion in the medium was increased the amount of 2-thiobarbituric acid color material was also increased, reaching a maximum at 7×10^{-4} M $Fe(NH_4)_2(SO_4)_2$. Above this maximum the formation of 2-thiobarbituric acid color material was inhibited. Lipid peroxide formation was correlated with thyroxine degradation at various temperatures. The peak thyroxine degradation activity was at pH 4.5 and 6.5 in acetate buffer and sodium phosphate buffer, resp. Degradation was not inhibited by high concentrations of thyroxine, and reached a maximum at relatively low concentrations. Microsomal proteins may work with unsaturated fatty acids present in the particles in the oxidation or hydroxylation of the β-phenyl ring of thyroxine.

8240 METABOLIC PATHWAYS OF BILE ACID SYNTHESIS. (E.) Elliott, W. H. (St. Louis U. Sch. Med., Mo.) and P. M. Hyde. *Am. J. Med.* 51(5):568-579, 1971.

The literature is reviewed (140 references). With species-specific variations, the major pathway for the metabolism and excretion of cholesterol in mammals is by hepatic formation of acidic steroids. Man synthesizes only 2 primary bile acids (cholic and chenodeoxycholic acids) and conjugates each with either taurine or glycine, forming primary bile salts. Rats and mice produce several additional bile acids. In most species it appears that the rate-limiting step in biosynthesis of bile acids is the 7α-hydroxylation of cholesterol.

8241 INTERRUPTION OF ENTEROHEPATIC CIRCULATION OF DIGITOXIN BY CHOLESTYRAMINE. II. EFFECT ON METABOLIC DISPOSITION OF TRITIUM-LABELED DIGITOXIN AND CARDIAC SYSTOLIC INTERVALS IN MAN. (E.) Caldwell, J. H. (Ohio State U. Coll. Med., Columbus), C. A. Bush and N. J. Greenberger. *J. Clin. Invest.* 50(12):2638-2644, 1971.

Normal human volunteers received maintenance doses of cholestyramine (16 g/day for 7 days) beginning 8 hr after digitalization with 1.2 mg of ^{3}H-digitoxin. Administration of cholestyramine caused a reduction in the half-life of total serum radioactivity from 11.5 to 6.6 days and, in that fraction extractable with chloroform, from 6.0 to 4.5 days, compared with controls. Compared with controls not receiving cholestyramine, but receiving the same digitalizing dose, the cholestyramine-treated subjects showed a more rapid return to normal of such parameters of cardiac function as left ventricular ejection time and the electromechanical systole (QS_2), measured as the interval from the onset of the Q-wave of the electrocardiogram to the first major component of the second heart sound on the phonocardiogram. There was a positive correlation of 0.64 between the QS_2 values and levels of that label which could be extracted with chloroform. The administration of cholestyramine blocks the reabsorption in the intestine of the cardiac glycoside which is excreted in the bile, thus shortening its effective half-life.

8242 INTERRUPTION OF THE ENTEROHEPATIC CIRCULATION OF DIGITOXIN BY CHOLESTYRAMINE. I. PROTECTION AGAINST LETHAL DIGITOXIN INTOXICATION. (E.) Caldwell, J. H. (Ohio State U. Coll. Med., Columbus) and N. J. Greenberger. *J. Clin. Invest.* 50(12):2626-2637, 1971.

In an in vitro preparation cholestyramine was found to bind a significant percentage of ^{3}H-digoxin and ^{3}H-digitoxin and this binding was only slightly inhibited by the addition of bile to the incubation medium. Intragastric instillation of cholestyramine in rats before the s.c. injection of a 100% fatal dose of digitoxin (10 mg/kg) was accompanied by a mortality rate of only 30%. Oral administration of cholestyramine before the s.c. injection of ^{3}H-digitoxin increased the rate of fecal excretion of ^{3}H and was accompanied by lower brain levels of this compound and its metabolites than in controls. In guinea pigs, p.o. administration of cholestyramine before s.c. injection of 4 and 10 mg/kg of digitoxin was accompanied by survival rates of 70% and 25%, resp., compared with 30% and 0% in controls. In cholestyramine-pretreated guinea pigs, there were lower hepatic and cardiac levels of ^{3}H-digitoxin and its metabolites at 90 min after injection. No significant changes in serum K^+ levels were seen with administration of cholestyramine.

8243 PREVENTION BY CHLORAMPHENICOL OF SUPPRESSED HEPATIC AZO REDUCTASE ACTIVITY DUE TO 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE. (E.) Blunck, J. M. (U. Melbourne Dept. Pathol., Victoria, Australia), B. J. Lees and N. P. Madsen. *Chem. Biol. Interactions* 4(3):219-222, 1971/72.

Male Sprague-Dawley rats were pair-fed diets containing either no supplements (controls); 2% chloramphenicol (CAP); 0.06% 3'-methyl-4-dimethylaminoazobenzene (3'-MeDAB); or 2% CAP and 0.06% 3'-MeDAB. Rats were sacrificed after 11 days. In liver homogenates, administration of CAP alone was accompanied by a significant increase in dimethylaminoazobenzene (DAB) reduction, while administration of 3'-MeDAB alone was accompanied by a significant decrease in DAB reduction. When both agents were administered, DAB reduction was maintained at control levels. Similar results were seen with values of aminopyrine N-demethylation and CAP nitroreduction. Results were similar when expressed as either micromoles of DAB cleaved/min/g wet liver or as protein content of the 9000 times gravity supernatant. However, when results were expressed as micromoles of DAB cleaved/min/liver/100 g body weight, in addition to the significant decrease in DAB reduction following treatment with 3'-MeDAB and the significant increase following treatment with CAP, DAB reduction in the livers of rats receiving both agents was significantly increased over that in controls. It is concluded that these 2 agents exert antagonistic effects on both reductive and oxidative processes in the 9000 times gravity supernatant fraction of rat liver.

8244 BILIRUBIN EXCRETION IN RATS WITH NORMAL AND IMPAIRED BILIRUBIN CONJUGATION: EFFECT OF PHENOBARBITAL. (E.) Robinson, S. H. (Harvard Med. Sch., Boston, Mass.), C. Yannoni and S. Nagasawa. *J. Clin. Invest.* 50(12):2606-2613, 1971.

In both normal and heterozygous Gunn rats, administration of phenobarbital caused marked increases in the activity of hepatic bilirubin uridine diphosphate-glucuronyl transferase activity. This was not seen in homozygous Gunn rats who lack this enzyme activity. Increased in vivo excretion of bilirubin was seen only in the heterozygous Gunn rats, in which the maximum capacity to excrete bilirubin into bile (T_{max}), and the activity of the conjugating enzyme were 50% of normal. Administration of phenobarbital to heterozygous Gunn rats caused a 2-fold rise in excretion of conjugated bilirubin, and a increase of the T_{max} to levels seen in normal rats. In untreated normal and heterozygous Gunn rats infused with unconjugated bilirubin, plasma and urine consistently yielded conjugated bilirubin. There was also found to be a direct relationship between the T_{max} and both the rate of bile flow and the activity of the conjugating enzyme. It is concluded that the unique effect of phenobarbital in the heterozygous Gunn rat is mediated mainly by an increase in the limited capacity for conjugation of bilirubin, with a concomitant increase in the functional secretory capacity.

8245 BROMOBENZENE-INDUCED HEPATIC NECROSIS: SPECIES DIFFERENCES AND PROTECTION BY SKF 525-A. (E.) Mitchell, J. R. (NIH, Bethesda, Md.), W. D. Reid, B. Christie, J. Moskowitz, G. Krishna and B. B. Brodie. *Res. Commun. Chem. Pathol. Pharmacol.* 2(6):877-888, 1971.

Bromobenzene (1 ml/kg) caused extensive necrosis in centrilobular areas of the liver in rats and mice and minimal-to-moderate necrosis in rabbits and hamsters. However, even the highest dose of bromobenzene (1.5 ml/kg, i.p.) failed to produce hepatic lesions in the hen, toad, frog or neonatal rat. When the various species were arranged according to their ability to metabolize bromobenzene (reflected by plasma and liver levels), a distinct separation into 2 groups of fast and slow metabolizers was noted. All species demonstrating necrosis were fast metabolizers, while those resistant to necrosis were slow metabolizers. SKF 525-A (β-diethylaminoethyl diphenylpropyl acetate) given to rats concomitantly with the hepatotoxic hydrocarbons protected against liver damage induced by bromobenzene and iodobenzene, and blocked the metabolism of bromobenzene. Bromobenzene itself does not produce cellular damage; a chemically reactive metabolite, perhaps bromobenzene epoxide, could be the toxic agent.

8246 EFFECT OF HYPOXIA ON BILIARY SECRETION WITH PRESERVATION OF THE ENTEROHEPATIC CIRCULATION. (E.) Kakumoto, Y. (Massachusetts Gen. Hosp., Boston), R. C. Gardner, K. J. Isselbacher and R. A. Malt. *Surg. Forum* 22:47-48, 1971.

Bile from fasting rats was collected and returned through a duodenostomy tube every 30 min, as the animals were exposed to normal room air for 2-3 hr, followed by exposure to 10% O_2:90% N_2 for 2 hr. Low O_2 exposure increased arterial PO_2, PCO_2, lactate and pH, however, no change in bile flow was noted and only slight decreases in blood pressure were observed. When rats were exposed to 7.5% O_2:92.5% N_2, significant blood pressure decreases and lower rates of bile secretion were observed. Results suggest that bile flow is not altered by hypoxia alone, but rather by hypoxia-induced hypotension.

8247 THE LIVER AS A LYMPHOCYTE ANTIGEN MODIFIER. (E.) Edelstone, D. I. (City of Hope Natl. Med. Ctr., Duarte, Calif.), R. H. Yonemoto and R. Hargreaves. *Surg. Forum* 22: 280-282, 1971.

Rabbits were injected intraportally with lymphocytes from unrelated rabbits and 21 days later were given 2 autografts, 2 grafts from the lymphocyte donor and 2 unrelated grafts in the lateral flank. At the end of 10 days, all 16 autografts were in excellent condition, while 6 unrelated grafts were in poor condition and the 10 others were necrotic. The conditions of the skin grafts from the lymphocyte donors were good in 9, fair in 3 and poor in 4. Results suggest that the lymphocytes from donor rabbits were modified in some way in the liver to induce prolongation of skin grafts from the same donor.

8248 INACTIVATION OF ANGIOTENSIN II BY THE LIVER. (E.) Rangel, D. M. (VA Hosp., Los Angeles, Calif.), J. J. Ford, Jr., W. Annan and H. E. Gordon. *Surg. Forum* 22:79-81, 1971.

When ^{14}C-angiotensin II (^{14}C-AT) was injected into the femoral vein of mongrel dogs 3 min prior to sacrifice, 62.5% of the radioactivity was recovered from the liver, 11.7% from the kidneys and 7.0% from the spleen. When the ^{14}C-AT was injected directly into the portal vein of normal dogs, 72.4% was recovered from the liver. However, when the vasopressor was administered under the same conditions to dogs whose livers had been subjected to ischemia for 2 hr, only 60.2% was retained in the liver. Injection of ^{14}C-AT into the renal or splenic arteries resulted in renal retention of 14.3% and splenic retention of 16.7%, resp. Within 5 hr after ^{14}C-AT administration, 34% of the originally retained radioactivity was present in the normal liver, compared to only minimal retention in the ischemic liver.

8249 PLASMA MEMBRANES IN ACUTE LIVER INJURY. BIOCHEMICAL CHANGES INDUCED BY CARBON TETRACHLORIDE. (E.) Le Page, R. N. (U. Melbourne Dept. Pathol., Parkville, Victoria, Australia) and P. R. Dorling. *Aust. J. Exp. Biol. Med. Sci.* 49(4):345-350, 1971.

Three plasma membrane enzymes in preparations isolated from livers of rats treated with a single high dose of CCl_4 (6 ml/kg, intragastric) showed a decrease in activity. At 2.5 hr 5'-mononucleotidase activity was decreased, and Na+ - K+ - ATPase showed a decrease at 12 hr, while

Mg2+ - ATPase similarly showed a decrease in mean value at 12 hr. Initial tests were made at dose levels of 2.5, 4.0 and 6.0 ml of CCl_4/kg and essentially similar results were obtained. Repeated washings of freshly prepared membranes from CCl_4 treated rats had no effect on the above results. Normal lipid and/or protein relationships of the liver cell plasma membrane are altered, and there may be an early loss of structural integrity of the whole or part of the liver cell plasma membrane early in the course of this kind of toxic injury to liver cells.

8250 THE EFFECT OF AUXILIARY LIVER TRANSPLANTATION ON POSTHEPATECTOMY COMA IN THE DOG. (E.) Chandrasakeram, A. K., J. G. Beaudoin and M. Slapak. *Arch. Surg.* 103(6):728-734, 1971.

Total hepatectomy was performed on 59 dogs divided into 3 groups. In group A, 17 dogs receiving total hepatectomy alone, the mean survival was 18.4 hr. The mean survival was increased to 4.8 days in 16 dogs in group B, who had auxiliary liver transplantation performed immediately after total hepatectomy. In these animals blood urea nitrogen values never fell below 7 mg% and transaminase levels, increased after operation, generally fell within 48 hr. Serum ammonia levels did not change and bilirubin levels increased only after the second day. The alkaline phosphatase levels gradually increased in all animals with transplants. At autopsy the transplanted liver showed vascular congestion and massive necrosis. Twenty-six dogs in group C received auxiliary transplants 12-14 hr after hepatectomy, at a time when they were in stage 3 to 4 hepatic coma. Survival was prolonged to 27 hr following hepatectomy. Many of the constant parameters of hepatic coma were reversed (serum ammonia, bilirubin level, and BSP level) within 2 hr of the transplant. At autopsy, hepatic necrosis with periportal polymorphonuclear infiltrates and hemorrhagic dilatation of blood vessels were the common finding in the liver. The life of the comatose dog after total hepatectomy can be prolonged by the performance of an homologous auxiliary transplant, but the reason for lack of long term survival is not clear.

8251 CONTRIBUTION OF INTESTINAL LECITHIN TO BILIARY LECITHIN EXCRETION. (E.) Tompkins, R. K. (UCLA Sch. Med., Los Angeles, Calif.) and W. King, III. *Surg. Forum* 22:381-382, 1971.

Four 2-month-old fasting pigs were splenectomized, and the cystic duct and pylorus were ligated. Catheters were placed in the thoracic duct, portal vein, infrahepatic vena cava and the common bile duct of each animal. After baseline samples were obtained, 50 μc of ^{14}C (U)-lecithin in 5 ml of fresh pig gallbladder bile were instilled in the duodenum, and timed samples were collected from each catheter for 8.5 hr. Total lipid radioactivity increased rapidly in the bile and lymph. Bile radioactivity was greater than that of the lymph in the first 4 hr, after which lymph predominated. Triglycerides accounted for 43% of the activity in portal blood, 69% in the vena cava blood and 73% in lymph. However, 70% of the lipid radioactivity in the bile was in the lecithin fraction.

8252 STUDIES ON EXPERIMENTAL HYPOTROPHY IN THE RAT. II. DEVELOPMENT OF SOME LIVER ENZYMES OF GLUCONEOGENESIS. (E.) Chanez, C. (Port Royal, Hosp., Paris), C. Tordet Cardiroit and J. M. Roux. *Biol. Neonate (Basel)* 18(1-2): 58-65, 1971.

8253 AMINO ACID REGULATION OF SYNTHESIS OF RIBONUCLEIC ACID AND PROTEIN IN THE LIVER OF RATS. (E.) Wannemacher, R. W. (Rutgers U. Biol. Res. Bureau, New Brunswick, N. J.), C. F. Wannemacher and M. B. Yatvin. *Biochem. J.* 124(2):385-392, 1971.

8254 THE PENTOSE PHOSPHATE PATHWAY IN RABBIT LIVER. STUDIES ON THE METABOLIC SEQUENCE AND QUANTITATIVE ROLE OF THE PENTOSE PHOSPHATE CYCLE BY USING A SYSTEM IN SITU. (E.) Williams, J. F. (U. New South Wales, Sch. Biochem., Kensington, Australia), K. G. Rienits, P. J. Schofield and M. G. Clark. *Biochem. J.* 123(5): 923-943, 1971.

8255 BILE ACIDS DURING PRENATAL LIFE: TIME OF APPEARANCE. NATURE, ORIGIN AND EVOLUTION. (Fr.) Croizat, B. (CNRS Nutr. Res. Ctr., Bellevue, France) and M. Lambiotte. *Arch. Sci. Physiol. (Paris)* 25(3):303-326, 1971.

8256 CHARACTERIZATION OF VITAMIN K FROM PIG LIVER AND DOG LIVER. (E.) Duello, T. J. (St. Louis U. Sch. Med., Mo.) and J. T. Matschiner. *Arch. Biochem. Biophys.* 144(1): 330-338, 1971.

8257 INCORPORATION OF AMINO ACIDS BY ISOLATED RAT LIVER AND SKELETAL MUSCLE MITOCHONDRIA. (E.) Sirotzky De Favelukes, S. (U. Buenos Aires, Argentina), M. Schwarcz De Tarlovsky and A. O. M. Stoppani. *Acta Physiol. Lat. Am.* 21(1):30-39, 1971.

8258 REGENERATION OF THE LIVER AFTER PARTIAL HEPATECTOMY WITH RESPECT TO AGE (CYTOPHOTOMETRIC STUDIES). (Ger.) Paulini, K. (U. Ulm Ctr. Biol. Theoret. Med., Germany), G. Beneke and U. Paukner. *Actuelle Gerontol.* 1(8): 455-459, 1971.

8259 X-RAY FLUORESCENCE EXAMINATION OF ZINC, COPPER AND COBALT IN THE PANCREAS OF

SOME MAMMALS. (Ger.) Galabowa, R. (Med. U., Sofia, Bulgaria), P. Petrov and J. Kolev. *Acta Histochem. (Jena)* 39(2):335-342, 1971.

8260 THE EFFECT OF SEX STEROIDS ON THE LIVER GLYCOGEN IN INTACT AND ADRENALECTOMIZED RATS. (E.) Avdalovic, N. (U. Zagreb Fac. Med., Yugoslavia). *Pfluegers Arch.* 326(3):211-222, 1971.

8261 DEMONSTRATION OF GLUCOSE 6 PHOSPHATASE ACTIVITY IN HEPATOCYTES FOLLOWING TRANSPARENCHYMAL PERFUSION FIXATION WITH GLUTARALDEHYDE. (E.) Kanamura, S. (Kyoto U. Chest Dis. Res. Inst., Japan). *J. Histochem. Cytochem.* 19(6):386-387, 1971.

8262 ALTERATIONS IN HEPATIC POLYRIBOSOMES AFTER FASTING AS A FUNCTION OF AGE. (E.) Sidransky, H. (U. Pittsburgh Sch. Med., Pa.) and E. Verney. *Nutr. Rep. Int.* 3(6):389-394, 1971.

8263 FREE AND BOUND HEPATIC POLYRIBOSOMES AFTER PARTIAL HEPATECTOMY: POOL SIZES AND SEDIMENTATION PATTERNS. (E.) Zweig, M. (Washington U. Sch. Med., St. Louis, Mo.) and J. W. Grisham. *Biochim. Biophys. Acta* 246(1):70-80, 1971.

8264 BIOCHEMICAL CHANGES IN THE LIVER AFTER INTRAVENOUS ADMINISTRATION OF COLLOIDAL GOLD (^{198}Au). (Fr.) Gheorghe, N. (D. Danielopolu Inst. Physiol. Norm. Pathol., Bucharest). *Rev. Roum. Physiol.* 8(3):293-297, 1971.

8265 GLUCOSE (HEXOSE-6-PHOSPHATE) DEHYDROGENASE IN LIVER OF RAINBOW TROUT. (E.) Shatton, J. B. (Temple U. Sch. Med., Philadelphia, Pa.), J. E. Halver and S. Weinhouse. *J. Biol. Chem.* 246(15):4878-4885, 1971.

8266 BILIRUBIN AND BILIARY SECRETION. (Por.) Cardoso, V. (Sch. Med., Porto, Portugal). *J. Med. (Porto)* 75(1477):611-615, 1971.

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8273 THE EFFECT OF SOUND, LIGHT AND VIBRATORY STIMULI ON SERUM LIPID LEVELS AND LIVER FATTY ACID CONTENT OF OLD AND ADULT RATS. (E.) Szamosi, T. (Semmelweiss Med. U., Budapest, Hungary). *Experientia* 27(6):628-629, 1971.

8274 ENDOCYTIC UPTAKE AND VESICULAR TRANSPORT OF INJECTED HORSERADISH PEROXIDASE IN THE VACUOLAR APPARATUS OF RAT LIVER CELLS. (E.) Creemers, J. (Catholic U. Vesalius Inst., Louvain, Belgium) and P. J. Jacques. *Exp. Cell Res.* 67(1):188-203, 1971.

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8276 THE EFFECT OF AMINOGLUTETHIMIDE ON THE METABOLISM OF TESTOSTERONE IN RAT LIVER IN VITRO. (E.) Starka, L. (Charles U. Sch. Gen. Med., Prague), K. Motlik and K. Horky. *J. Steroid Biochem.* 2(2):157-160, 1971.

8277 FATTY ACID COMPOSITION OF MITOCHONDRIAL AND MICROSOMAL LIPIDS OF RAT LIVER AFTER ACUTE ETHANOL INTOXICATION. (E.) Comporti, M. (U. Turin Inst. Gen. Pathol., Italy), E. Burdino and F. Raja. *Life Sci.* [*II*] 10(15):855-866, 1971.

8278 CHANGES IN THE ACTION OF DRUGS FOLLOWING THEIR TRANSFORMATION IN THE LIVER. (Ger.) Remmer, H. (U. Tubingen Inst. Toxicol., Germany). *Monatsschr. Kinderheilkd.* 119(7): 382-388, 1971.

8279 IMMUNOCHEMICAL CHARACTERIZATION OF ENZYME ACTIVITIES IN LIVER PLASMA MEMBRANES OF THE RAT. (E.) Blomberg, F. (U. Stockholm Wenner Gren Inst. Exp. Biol.) and P. Perlmann. *Exp. Cell Res.* 66(1):104-112, 1971.

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8281 CONCENTRATIONS AND SYNTHESIS OF THE ACID-SOLUBLE NUCLEOTIDES IN THE LIVER OF VARIOUS SPECIES OF VERTEBRATES. (E.) Zhivkov, V. (Inst. Comp. Anim. Pathol., Sofia, Bulgaria). *Comp. Biochem. Physiol.* 39(4B):701-708, 1971.

8282 METABOLISM OF SULFATED MUCOPOLYSACCHARIDES OF THE LIVER IN PROTEIN DEFICIENCY AND CHRONIC ALCOHOL INTOXICATION. (Ger.) Becker, K. (U. Hamburg Ist Med. Clin., Germany). *Klin. Wochenschr.* 49(9):558-559, 1971.

8283 DAILY RHYTHMIC CHANGES IN HEPATIC PHENYLALANINE HYDROXYLASE ACTIVITY: ROLE OF DIETARY PHENYLALANINE. (E.) Castells, S. (State U. New York Downstate Med. Ctr., Brooklyn) and S. Shirali. *Life Sci.* [*II*] 10(4):233-239, 1971.

See also number: 8084

INTESTINE

8284 ISOLATION AND PURIFICATION OF A PROLIDASE FROM PIG INTESTINAL MUCOSA. (E.) Sjöström, H. (U. Copenhagen Dept. Biochem. C), O. Norén and L. Josefsson. *Acta Chem. Scand.* 25(5): 1911-1913, 1971.

The purification of a prolidase from pig intestinal mucosa was described, prolidase activity being determined spectrophotometrically using L-alanyl-L-proline as substrate. Pieces of pig small intestine were extracted for 1 hr in precooled distilled water; the extract was centrifuged and the supernatant then lyophilized. The fractionated supernatant precipitating between 35 and 50% $(NH_4)_2SO_4$ saturation was collected, dissolved in Tris buffer, dialyzed, and the clear supernatant was applied to a 2.5 cm x 21 cm column of DEAE cellulose. The enzyme solution was concentrated by ultrafiltration and further purified by polyacrylamide gel electrophoresis. Purification resulted in an enzyme preparation having about 500 times higher specific activity than that of the acid extract. The overall recovery in the purification procedure has been about 5%, equivalent to about 100 µg purified protein per g of lyophilized mucosa extract.

8285 DETERMINATION OF BILE ACID CONVERSION POTENCIES OF INTESTINAL BACTERIA BY SCREENING *IN VITRO* AND SUBSEQUENT ESTABLISHMENT IN *GERMFREE RATS*. (E.) Dickinson, A. B. (Karolinska Inst., Stockholm), B. E. Gustafsson and A. Norman. *Acta Pathol. Microbiol. (Scand.)* [*B*] 79(5):691-698, 1971.

The bile acid conversion potencies of 124 facultatively and strictly anaerobic bacteria (22 genera) were determined in the intestinal tracts of formerly germfree rats. *In vitro*, 14 of the 22 genera examined deconjugated glyco- and taurodeoxycholic acids, and transformation of cholic acid was carried out by 8 of the genera. None of the 124 strains showed the ability to 7α-dehydroxylate cholic acid under the test conditions. Twenty strains selected from 9 of the genera which were capable of deconjugation *in vitro* were established in germ-free rats as monocontaminants. Among these strains, *Eubacterium*, *Streptococcus*, and *Clostridium butyricum* were able to hydrolyze more than 70% of the conjugated bile acids in the cecum and colon. While 4 strains showed no activity with regard to hydrolysis of the conjugated bile acids, the remaining 13 strains gave between 4 and 44% hydrolysis. Eight strains which split both glycine and taurine conjugates *in vitro* could not be implanted as monocontaminants. The number of viable organisms present in the cecum could not be correlated with the percentage of deconjugation of bile acids in the cecum and colon. Thus, the ability of microorganisms to deconjugate bile acids *in vitro*, cannot be used as a criterion for their potential deconjugation ability in the intestinal tract.

8286 THE CONTRIBUTION OF THE INTESTINAL MUCOSA TO THE TOTAL SERUM ALKALINE PHOSPHATASE ACTIVITY. (E.) Reynoso, G. (Roswell Park Mem. Inst., Buffalo, N. Y.), E. G. Elias and A. Mittelman. *Am. J. Clin. Pathol.* 56(6):707-712, 1971.

Alkaline phosphatase was measured in the lymph of 6 patients undergoing thoracic duct drainage, and the incorporation of the intestinal isoenzyme into the general circulation in the fasting state and following ingestion of a fat-enriched meal was studied. In the fasting state the lymph contained an average of 72 micro-international units (mIU) alkaline phosphatase/ml. The total activity began to rise soon after the ingestion of the fat-enriched meal, reaching a peak of 590 mIU/ml by 7 hr. At peak activity, the mean concentration of enzyme inhibited by L-phenylalanine reached a maximum of 70% of the total, as compared to 12% in the fasting state. The urea-resistant fraction rose from an average of 48% of the total in the fasting state to a maximum of 78% at the time of peak activity. Over the 12 hr experimental period, an average of 227,051 mIU of alkaline phosphatase was collected from the lymph. No correlation between the amount of enzyme in the lymph and the blood group or secretor status of patients was observed.

8287 MUCOSAL MORPHOLOGY AND BACTERIAL FLORA OF ILEAL CONDUITS. (E.) Gracey, M. (Roy. Child. Hosp. Res. Found., Melbourne, Australia), R. Kay and R. F. Bishop. *Invest. Urol.* 8(6):596-603, 1971.

8288 INFLUENCE OF THE INDIGENOUS GASTRO-INTESTINAL MICROBIAL FLORA ON DUODENAL ALKALINE PHOSPHATASE ACTIVITY IN MICE. (E.) Yolton, D. P. (U. Texas Dept. Microbiol., Austin), C. Stanley and D. C. Savage. *Infect. Immun.* 3(6):768-773, 1971.

8289 PEPSINOGEN DETERMINATIONS AS A POSSIBLE MEANS FOR EVALUATION OF GASTRIC ACID SECRETION. (E.) Fischermann, K. (Finsen Inst., Copenhagen), C. S. Strande and P. H. Petersen. *Am. J. Gastroenterol.* 56(5):447-452, 1971.

The relationship between the content of pepsinogen in serum and/or urine and the gastric acid secretion during augmented histamine stimulation was investigated in 47 patients. Uropepsinogen, serum pepsinogen and augmented histamine tests revealed that the group comprised 26 patients with gastric acid secretion and 21 nonacid secretors. Nonacid secretors showed no increase in serum pepsinogen after stimulation with pyrilamine maleate followed by histamine. In some patients with gastric acid secretion, serum pepsinogen increased 40 min after histamine injection. However, one of 11 patients with gastric acid secretion showed a decrease of serum pepsinogen in spite of a considerable acid secretion, and 2 patients had only a slight increase in serum pepsinogen. Two of 8 patients with achlorhydria showed a considerable increase in serum pepsinogen after histamine. Thus, information about gastric acid secretion is not readily obtainable from examinations of serum pepsinogen changes alone. Determination of baseline levels of serum pepsinogen and uropepsinogen were of much greater value for estimating the gastric acid secretion. It was found that with values of uropepsinogen below 25 milli U/hr and/or of serum pepsinogen, below 50 milli U/liter abolished acid secretion could be expected. Correspondingly, when values of uropepsinogen above 60 milli U/hr and serum pepsinogen about 12 milli U/liter were found, secretion of gastric acid should be expected.

8290 ELECTROLYTE BARRIER AND HISTOLOGIC PATTERN OF THE GASTRIC MUCOSA IN MAN. (E.) Konturek, S. (Med. Acad. Inst. Physiol, Cracow, Poland), T. Stolfa and J. Szczudrawa. *Acta Med. Pol.* 12(3):413-426, 1971.

Patients with normal gastric mucosa or only superficial gastritis (group I) tolerated the tests of basal secretion and maximal pentagastrin-stimulated secretion better than the patients with inflammatory and atrophic lesions (group II), and cases with atrophy of the gastric mucosa (group III). Negative values of electrolyte balance which indicated diffusion of ions from the stomach through the mucosa to the blood were observed with respect to H^+ in group I in 3 patients (25%), in group II in 4 patients (44%) and in group III in 6 patients (85%). Low values of H+ balance were observed in group III and were associated with high values of Na^+ balance, and conversely in group I. The balance of Cl^- and K^+ ions behaved irregularly, and the differences between groups were not significant. Positive correlation was found between the values of H^+ balance and basal secretion, and between H^+ balance and maximal, pentagastrin-stimulated, secretion. Negative correlation was observed between the values of Na^+ balance and basal secretion and between Na^+ balance and maximal, pentagastrin-stimulated, secretion. The differences between Cl^- and K^+ balance and maximal secretion did not correlate significantly. Examining the electrolyte barrier appears important in assessing the state of the gastric mucosa since the mucosal morphology and secretory function correlate with the electrolyte barrier.

8291 GASTROENDOSCOPIC EXAMINATION IN CHILDREN. (E.) Fukami, H. (Keio U. Sch. Med., Japan), Y. Ishii, Y. Hiki, S. Baba and K. Katsumata. *Asian Med. J.* 14(9):603-616, 1971.

Some of the practical aspects of gastric endoscopy in children are discussed with reference to anatomical differences by age, types of gastric endoscopes, anesthesia, premedication, manipulation, examiner and assistants, aftercare for detubation of the gastric endoscope, and some general suggestion for pediatric gastric endoscopy. Gastroendoscopic examinations were performed on 71 patients under 19 yr of age, of which 21 cases were below age 15 (most of whom had gastritis or duodenal ulcer). Two cases were 5 yr old. Either the S-type or the BL-type fibergastroscope, together with a V-type or a Va-type gastrocamera, were used in all cases. In no case was any accident observed. Three cases are presented in detail in which gastric endoscopy was useful in diagnosis to visualize the disorders and rule out pathological changes. In children with gastroduodenal disease, X-ray examinations are usually difficult to perform, and pathological changes are often overlooked. There studies indicate that, with a lower limit of age 5 yr, endoscopic examination may be safely carried out with the present commercial endoscopes. This procedure may supplement diagnosis and therapy in childhood disorders, and may be possible for still younger ages in the future.

8292 LIVER FUNCTION TEST WITH ^{131}I-BSP AND SCINTICAMERA. (E.) Torizuka, K. (Kyoto U. Sch. Med., Japan), K. Hamamoto, R. Morita, M. Fujii, T. Mukai, T. Kousaka, K. Itoh, J. Nakagawa and C. Minaguchi. *Jap. J. Nucl. Med.* 8(3):143-154, 1971.

After i.v. administration of ^{131}I-BSP, serial scintiscans (at 3-min intervals for 90 min) were used to visualize liver deformity, change of distribution of ^{131}I in the liver, space occupying lesions of the liver, and appearance of ^{131}I in the gallbladder and intestine in normals and patients with various liver and gallbladder diseases. Maximum hepatic uptake of ^{131}I occurred at 12-20 min in normals, 20-30 min in chronic hepatitis, over 30 min in cirrhosis, 20-33 min in hepatic tumors and cholelithiasis, and over 90 min in extrahepatic obstructive jaundice. Using ^{131}I-labeled BSP and radioactive iodine serum albumin, the percentage retention of ^{131}I-BSP in serum at 10 min was within 10% in normals, 10-20% in chronic hepatitis, over 20% in cirrhosis, 10-20% in hepatic tumor, 65-80% in extrahepatic obstructive jaundice, and there was a good correlation between the percent retention of ^{131}I-BSP in serum at 10 min and percent retention of BSP in serum at 30 min.

8293 A SIMPLE METHOD OF DETERMINATION OF IRON ABSORPTION USING $^{51}Cr_2O_3$ AS NON-ABSORBABLE MARKER, AND ITS CLINICAL APPLICATION. (E.) Inamoto, Y. (Kyoto U. Fac. Med., Japan). *Jap. J. Nucl. Med.* 8(3):172-184, 1971.

The percentage of absorption of iron from the bowel in man was studied after simultaneous p.o. administration of 40 mg of carrier iron labeled with ^{59}Fe and 1 mg of $^{51}Cr_2O_3$ with 100 mg of ascorbic acid. Fecal levels of ^{59}Fe and ^{51}Cr were measured during the phase of maximal fecal excretion. Results with this method correlated best with whole body counting and, to a lesser extent, with the red cell radioiron method and with the double-isotope method (Saylor-Finch). The clinical value of the various iron absorption methods, in order of increasing magnitude were: red cell radioiron, double isotope, total body counting and the simple excretion ratio method.

8294 A SINGLE INTESTINAL INTUBATION TECHNIQUE FOR MULTIPLE FUNCTION STUDIES. (E.) Cowen, A. E. (Roy. Brisbane Hosp., Queensland, Australia) and C. B. Campbell. *Gut* 12(11): 936-937, 1971.

Aspiration holes are cut in the distal 15 cm of 1 side of a double-lumen tube and a fine polythene tubing is passed through this lumen and attached to a Watson capsule. The other side of the double lumen tube is sealed with a radiopaque marker, 25 cm from the distal end, and aspiration holes are cut in the distal 15 cm. The patient is starved overnight and intubated so that the radiopaque marker is positioned at the pylorus under X-ray control with image intensification. The length of the tube is such that, when the radiopaque marker lies at the pylorus, the Watson capsule will lie in the vicinity of the ligament of Treitz. Gastric function studies including fasting pH and gastric antibodies may be performed; the tube is not suitable for basal and stimulated acid secretion studies because of pyloric reflux. The duodenal lumen allows examination for bacteriologic studies including culture and colony counts, the presence of deconjugated bile salts, and examination for parasites. Pancreatic function may also be assayed.

8295 COMBINED PANCREAS AND LIVER SCANNING USING A DOUBLE ISOTOPE TECHNIQUE. (E.) McCready, V. R. (Roy. Marsden Hosp., Sutton, Surrey, England) and M. F. Cottrall. *Br. J. Radiol.* 44(527):870-877, 1971.

A dual isotope technique is described, which uses $^{99}Tc^m$ sulfur colloid as the liver specific agent, and a rectilinear scanner coupled to a small analogue computer. Nineteen patients were thought to have a space-occupying lesion on the pancreas scan. In 10 cases the lesion was confirmed, while in 4 the pancreas was normal; however, in 3 of these latter cases a malignant neoplasm was present elsewhere in the abdomen. A more common appearance in abnormal scans was the complete absence, or a reduced concentration of ^{75}Se-selenomethionine. In 12 of these cases the pancreas was normal macroscopically, but in 8 of the 12 there was pathology elsewhere in the abdomen, usually involving the gut. In normal pancreatic scans, confirmation was obtained in 35 of 38 cases, and 3 tumors were missed. The method is time consuming, the counting statistics poor, and the full examination is necessary to give the pancreatic outline. Further research is needed to develop faster methods of achieving present results while awaiting the introduction of a radiopharmaceutical, specific to the pancreas, which can be used in high activities.

8296 THERMOMETRY OF THE STOMACH AND ITS CLINICAL VALUE. (Rus.) Torossian, A. A. *Lab. Delo* (5):292-294, 1971.

8297 ARTIFACTS IN ^{99m}Tc SULFUR COLLOID LIVER SCANS. (E.) Hernberg, J. G. (New York U. Med. Ctr., N. Y.), P. Braunstein, R. Chandra and M. Blum. *J. Nucl. Med.* 12(10): 697-698, 1971.

8298 THE USE OF GASTROCAMERA IN OLD PATIENTS. (It.) Macchione, C. (U. Turin Dept. Gerontol., Italy). *G. Gerontol.* 19(3):220-227, 1971.

8299 ACCURACY OF LIVER SCINTIPHOTOGRAPHY USING A PLASTIC AND WATER PHANTOM. (E.) Vidrih, V. E. (St. Michael's Hosp., Toronto, Ontario, Canada) and H. P. Higgins. *Can. J. Surg.* 14(4):273-279, 1971.

8300 A LIVER PHANTOM FOR EVALUATING CAMERA AND SCANNER PERFORMANCE IN CLINICAL PRACTICE. (E.) Mould, R. F. (Roy. Marsden Hosp., London). *Br. J. Radiol.* 44(526):810-811, 1971.

8301 GASTRIC AND EXTRAGASTRIC VISCERAL LYMPHOGRAPHY. (Jap.) Uchida, H.

(Osaka U. Med. Sch., Osaka, Japan). *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 31(3):259-277, 1971.

8302 CALCIFICATIONS IN GASTROINTESTINAL MALIGNANCY: AN IMPORTANT CLUE IN RADIOLOGIC DIAGNOSIS. (E.) Gold, J. A. *Mt. Sinai J. Med.* 38(4):405-416, 1971.

8303 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Venkataraman, M. S. (Govt. Gen. Hosp., Madras, India) and M. G. Varadarajan. *Mediscope* 14(2):71-74, 1971.

8304 THE VALUE OF GASTROINTESTINAL ENDOSCOPY. (Fr.) Miller, G. *Med. Hyg. (Geneve)* 29(948):113-114, 1971.

8305 ENDOSCOPIC PANCREATIC CHOLANGIOGRAPHY. A NEW DIAGNOSTIC METHOD IN PANCREATIC DISEASES. (Fr.) Oi, I. (Tokyo Women's Med. Sch., Tokyo). *Med. Hyg. (Geneve)* 29(948):115-117, 1971.

8306 MEASUREMENT OF INTRA-ABDOMINAL PRESSURE AT LAPAROSCOPY. (E.) Coles, R. A. (Univ. Coll. Hosp., London). *Lancet* 1(7708): 1052, 1971.

8307 ADVANCES IN ENDOSCOPY OF INFANTS AND CHILDREN. (E.) Gans, S. L. (Cedars of Lebanon Hosp., Los Angeles, Calif.) and G. Berci. *J. Pediatr. Surg.* 6(2, Pt. 2):199-234, 1971.

8308 EMERGENCY GASTROSCOPY IN THE DIAGNOSIS OF MALLORY-WEISS SYNDROME. (Rus.) Semenov, V. V., N. S. Uteshev and V. G. Teriaev. *Khirurgiia (Mosk.)* 47(5):117-121, 1971.

8309 ELECTROGASTROGRAPHY IN GASTROINTESTINAL HEMORRHAGES. (Rus.) Struchkov, V. I. and V. N. Sundushnikov. *Khirurgiia (Mosk.)* 47(5): 113-117, 1971.

8310 TOLUIDINE BLUE STAINING TEST FOR EARLY DETECTION OF ORAL CANCER: AN ADJUNCT TO BIOPSY. (E.) Srivastava, Y. C. (MBBS, Main Market, Roorkee, India) and M. N. Mathur. *Dent. Dig.* 77(7):400-403, 1971.

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8318 DIAGNOSIS OF LIVER AND GALLBLADDER DISEASE USING AN AUTOMATIC COMPUTER. (Cz.) Horejsi, J. (Inst. Hematol. Blood Transfus., Prague), J. Nikl and D. Zmeskalova. *Vnitrni Lek.* 17(8):762-769, 1971.

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8321 DOUBLE RADIONUCLIDE PANCREATIC FUNCTIONAL SCINTIGRAPHY WITH A PROCESS COMPUTER.

(Ger.) Hundeshagen, H. (Med. Sch., Hanover, Germany), H. Creutzig and H. Dopslaff. *Radiol. Diagn. (Berl.)* 12(2):212-222, 1971.

8322 USE OF A PIEZOTRANSISTOR FOR A PRESSURE SENSITIVE RADIOTELEMETERING CAPSULE. (E.) Barbaro, V. (Inst. Health, Rome), A. D. Sargentini and M. Frank. *R.C. Rom. Gastroenterol.* 3(1):34-37, 1971.

8323 EXPERIENCE IN PERFORMANCE OF DUODENAL BIOPSY IN CHILDREN. (Rus.) Askambaeva, K. A. and I. I. Grintsevich. *Pediatriia (Mosk.)* 50(5):31-33, 1971.

8324 RADIOTELEMETRIC DETERMINATION OF THE FUNCTIONAL STATE OF THE STOMACH IN CHILDREN WITH DISEASES OF THE DIGESTIVE TRACT. (Rus.) Kharatian, A. M., I. A. Bodnia and G. N. Sadchikova. *Pediatriia (Mosk.)* 50(5):12-14, 1971.

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8327 DOUBLE DETECTOR SCINTICAMERA FOR VISUALIZATION OF COLD NODULES IN BULKY ORGANS. A PRELIMINARY PHANTOM INVESTIGATION. (E.) Mikolajkow, A. (Inst. Oncol., Warsaw, Poland) and W. K. Jasinski. *Nucl. Med. (Stuttg.)* 10(2): 201-203, 1971.

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8329 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Venkataraman, M. S. (Govt. Gen. Hosp., Madras, India) and M. G. Varadarajan. *Mediscope* 13(12):601-608, 1971.

8330 ANAPHYLAXIS TO BROMSULPHTHALEIN. (E.) Cooksley, W. G. E. (Roy. Hosp., Brisbane, Australia). *Med. J. Aust.* 2(5):257-258, 1971.

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See also numbers: 8232, 8335, 8415, 8422, 8765, 8766, 8913

GASTROINTESTINAL DISEASES

ESOPHAGUS

8332 MOTILITY STUDIES OF THE TERMINAL ESOPHAGUS IN CHILDREN WITH HIATAL HERNIA. (Ger.) Kehrer, B. (Univ. Pediatr. Surg. Clin., Bern, Switzerland) and A. Oesch. *Z. Kinderchir.* 10(3/4):345-358, 1971.

An area of increased intraluminal pressure in the region of the gastroesophageal sphincter was demonstrable in 32 normal infants between 1 and 20 months of age. A similar area was demonstrable in 8 of 9 children, aged 3 months to 12 yr, in the presence of achalasia or sliding hiatal hernia without fixation of the lower esophagus in the thorax. It was not demonstrable in any of 6 children, aged 2 months to 8 yr, in whom sliding hiatal hernia was accompanied by fixation of the lower esophagus, as above. Following plication of the fundus, the "pressure barrier" in the terminal esophagus was demonstrable in all 6 of them, appearing to involve a part of the lower tubular esophagus, as well as the vestibulum, and showing a wider range of pressures than those displayed by normal controls. Although gastroesophageal reflux did not appear to be caused by the absence of this pressure barrier, the presence of even slightly increased pressure in the area appeared to be able to prevent it.

8333 RESULTS OF THE SURGICAL TREATMENT OF HEMORRHAGING ESOPHAGEAL VARICES USING PORTACAVAL ANASTOMOSIS OR LIGATURE OF THE VARICES. (Ger.) Stelzner, F. (Univ. Surg. Clin., Hamburg-Eppendorf, Germany). *Bruns Beitr. Klin. Chir.* 218(8):673-678, 1971.

Ligation of hemorrhaging esophageal varices was practiced in 61 patients for whom portacaval shunt was contraindicated because of age (over 55 yr) and the presence of cirrhosis of the liver (52 of 61), portal thrombosis (7 of 61) or hepatic fibrosis (2 of 61). At the time of report, 39 of the 52 cirrhotic patients had died, with a maximal survival time of 2 yr, 11 months. The longest survival time among the 13 cirrhotic survivors had been 4 years, 4 months. The longest survival time among the 9 non-cirrhotic patients, all of whom were still living, had been 5 yr, 2 months.

8334 CEREBRAL FOOD EMBOLISM SECONDARY TO ESOPHAGEAL-CARDIAC PERFORATION. (E.) Itabashi, H. H. (Harbor Gen. Hosp., Torrance, Calif.) and L. O. Granada. *JAMA* 219(3):373-375, 1972.

A 23-yr-old mentally-retarded male, with features suggesting deLange's syndrome, who died of multiple miliary cerebral infarcts due to food emboli is presented. The food particles gained entrance into the cerebral circulation through an esophageal-cardiac opening as a result of a perforation in the bed of a chronic esophageal ulcer into the left auricle. Terminally, the patient suffered a sudden catastrophe characterized by hematemesis, coma, bladder and bowel incontinence, labored breathing and shock, and he died 11 hr later without recovering consciousness. At autopsy the brain contained countless acute miliary infarcts of the same age, and related arteries were occluded with food emboli located in the immediate vicinity. Other organs did not reveal any infarcts, but many small blood vessels in the heart, liver, and lungs contained food emboli similar to those in the brain.

8335 AN IMPROVED METHOD FOR DETECTION OF GASTROESOPHAGEAL REFLUX. (E.) McAlhany, J. C., Jr. (U. Florida Coll. Med., Gainesville), H. F. Thomas and E. R. Woodward. *Surg. Forum* 22:331-333, 1971.

Patients were prepared for study by placing 200 ml of 0.1 N HCl into the stomach by a Levin tube. The esophagus was then cleared by having the patient swallow water. In 14 patients the pH of the esophagus was measured by a Heidenberg pH telemetry capsule placed in the terminal esophagus, 5 cm proximal to the lower sphincter. Valsalva and Mueller maneuvers were performed in both sitting and supine positions. All patients tested by this method had a pH of less than 4 in the lower esophagus, as measured by the standard technique of inserting the capsule into the stomach and then withdrawing it. Antegrade passage of the capsule showed a low esophageal pH in only 9 of the 14 patients. Thus, 5 of the patients had false positive tests by the withdrawal method. In 56 additional patients, antegrade insertion of the standard pH probe and open tip catheter was performed. The probe was passed in 2-cm increments from the upper esophagus into the stomach, and Valsalva and Mueller maneuvers were performed every 6 cm, until the probe passed into the stomach. The standard withdrawal test was then performed in the same manner. No gastrointestinal reflux was detected by either method in 21 of the 56 patients. However, 35 patients showed an esophageal pH of less than 4 by the retrograde method, while in 10 of these patients the pH remained at or near neutrality until the probe passed through the lower esophageal sphincter.

8336 LOWER ESOPHAGEAL SPHINCTER DYSFUNCTION IN ACHALASIA. (E.) Cohen, S. (U. Pennsylvania Hosp., Philadelphia) and W. Lipshutz. *Gastroenterology* 61(6):814-820, 1971.

The effect of pneumatic dilation on the resting level of lower esophageal sphincter pressure and the lower sphincter pressure during deglutition was studied in 20 normal subjects and 16 patients with achalasia. Manometric measurements made before dilation revealed that patients with achalasia had resting pressures twice that seen in normal subjects and the sphincter pressure did not decrease to the level of gastric pressure during deglutition. Whereas in the patients with achalasia, pneumatic dilation was followed by a reduction in the resting pressure, the percentage by which lower esophageal sphincter pressure decreased during swallowing was the same before and after dilation. The residual pressure present in patients with achalasia seems to be a function of the resting pressure at which swallowing is initiated, this relationship remaining the same before and after pneumatic dilation. Thus, an obstruction to esophageal emptying, the magnitude of which is a direct function of the resting pressure, may result from the residual sphincter pressure seen in these patients.

8337 RECURRENCES OF HIATUS HERNIA IN CHILDHOOD. (Ger.) Von Der Oelsnitz, G. (City Hosp., Bremen, Germany) and F. Rehbein. *Paediatr. Prax.* 10(2):211-222, 1971.

8338 SURGICAL TREATMENT OF STENOSIS OF ESOPHAGUS RESULTING FROM PEPTIC ULCERATION AND CAUSTIC BURNS. (Hun.) Rubanyi, P. (Semmelweis Med. U., Budapest) and L. E. Szabo. *Magy. Sebesz.* 24(3):145-151, 1971.

8339 BONE METASTASES FROM CANCER OF ESOPHAGUS (22 CASES). (Fr.) Adenis, L., A. Lequint and G. Giaux. *Lille Med.* 16(6):835-842, 1971.

8340 HIATUS HERNIA. (E.) Gillison, W. (Gen. Hosp., Nottingham, England). *Lancet* 2(7719):315, 1971.

8341 WAYS FOR REDUCTION OF POSTOPERATIVE COMPLICATIONS DUE TO INADEQUACY OF THE ESOPHAGO-INTESTINAL ANASTOMOSIS. (Rus.) Bondar, G. V. and I. D. Baidalin. *Klin. Khir.* 51(5):1-5, 1971.

8342 RECURRENCE OF A TRACHEO-ESOPHAGEAL FISTULA FOLLOWING RADICAL SURGERY FOR CONGENITAL ESOPHAGEAL ATRESIA. (Rus.) Babliak, D. E. *Klin. Khir.* 51(5):8-12, 1971.

8343 RECONSTRUCTIVE OPERATIONS ON THE ARTIFICIAL ESOPHAGUS. (Rus.) Shalimov, A. A., A. G. Vinnichenko and G. O. Grigorian. *Klin. Khir.* 51(5):12-15, 1971.

8344 COMPLICATIONS OF ESOPHAGEAL DIVERTICULA (CLINICAL AND RADIOLOGIC DIAGNOSTIC DATA). (Rus.) Rosenfeld, L. G. *Klin. Khir.* 51(5):15-20, 1971.

8345 IMMEDIATE AND LATE RESULTS AFTER THE CREATION OF AN ARTIFICIAL ESOPHAGUS. (Rus.) Petrov, B. A. and A. P. Sitnik. *Khirurgiia (Mosk.)* 47(5):26-34, 1971.

8346 REVASCULARIZATION OF THE TRANSPLANT IN TOTAL LARGE INTESTINAL ESOPHAGOPLASTY. (Rus.) Berezov, I. E., S. S. Emelianov and M. D. Lapin. *Khirurgiia (Mosk.)* 47(5):103-105, 1971.

8347 SUPERFICIAL CARCINOMA OF THE ESOPHAGUS: REPORT OF TWO CASES. (Jap.) Yamamoto, Y., T. Miyake and J. Ariyoshi. *Naika Hokan (Jap. Arch. Intern. Med.)* 18(2):59-68, 1971.

8348 COMPENSATION OF DIGESTION AFTER RESECTION OF THE LOWER THIRD OF THE ESOPHAGUS AND THE CARDIA WITH INTERPOSITION OF A SEGMENT OF THE SMALL INTESTINE. (Rus.) Babichev, S. I. and B. S. Briskin. *Khirurgiia (Mosk.)* 47(5): 135-142, 1971.

8349 THE SURGICAL TREATMENT OF CARDIOESOPHAGEAL CANCER. (Rus.) Napalkov, P. N. and A. U. Krasner. *Khirurgiia (Mosk.)* 47(5):121-125, 1971.

8350 SARCOIDOSIS OF THE ESOPHAGUS. (E.) Wiesner, P. J., M. S. Kleinman (U. Rochester Sch. Med., N. Y.), J. J. Condemi, S. A. Resnicoff and S. I. Schwartz. *Am. J. Dig. Dis.* 16(10):943-951, 1971.

8351 ESOPHAGEAL DIVERTICULA (19 CASES). (Rum.) Lazar, C. (Inst. Pharm. Med., Iasi, Rumania), M. Chifan and C. Dolinescu. *Chirurgia (Bucur.)* 20(7):619-627, 1971.

8352 RESULTS OF TREATMENT OF SEVERELY BLEEDING ESOPHAGEAL VARICES. (E.) Ungeheuer, E. (Northwest Hosp., Frankfurt a. M., Germany) and H. Dalichau. *J. Cardiovasc. Surg.* 12(2):140-142, 1971.

8353 A CASE OF ESOPHAGEAL CYST OF BRONCHOGENIC ORIGIN. (Sp.) Perez Inigo Quintana, F. (Milit., Hosp., San Sebastian, Spain). *Med. Cir. Guerra* 33(5):19-23, 1971.

8354 PERFORATION OF THE ESOPHAGUS. (Hun.) Barna, L. (Semmelweis Med. U., Budapest), B. Sulyok and G. Mihok. *Magy. Sebesz.* 24(3): 152-157, 1971.

8355 MODIFICATION OF TEFLON ESOPHAGEAL DILATORS FOR BLIND DILATION OVER A STRING. (E.) Emerson, E. B., Jr. (Town of Webb

Health Ctr., Old Forge, N. Y.). *J. Thorac. Cardiovasc. Surg.* 62(2):248-249, 1971.

8356 CONGENITAL STENOSIS OF THE ESOPHAGUS. (Fr.) Despons, J. (Portmann Found., Bordeaux, France) and J. L. Despons. *Grenoble Med. Chir.* 9(9):303-305, 1971.

8357 MALLORY WEISS SYNDROME. (E.) Hollender, L. F. (Civil Hosp., Strasbourg, France), J. J. Kohler and J. Nonnenmacher. *J. Abdom. Surg.* 13(7):151-155, 1971.

8358 ESOPHAGOSCOPY AS AN EXPLORATORY METHOD IN INTERNAL MEDICINE. (Ger.) Schmid, E. (Med. Acad. Ist. Med. Clin., Lubeck, Germany), J. Krautheim, C. Billich and U. Ritter. *Internist Prax.* 11(3):369-373, 1971.

8359 SURGERY OF LEIOMYOMA OF THE ESOPHAGUS: REPORT OF 12 OPERATIONS. (Fr.) Toumieux, B. (Marie Lannelongue Ctr. Thorac. Cardiovasc. Surg., Paris), P. Levasseur and A. Rojas Miranda. *Chirurgie* 97(8):553-561, 1971.

8360 THORACIC DUCT DRAINAGE IN THE TREATMENT OF BLEEDING ESOPHAGEAL VARICES. (E.) Rigas, A. (State Gen. Hosp., Athens) and E. Tsardakas. *J. Cardiovasc. Surg.* 12(2):143-145, 1971.

8361 LARYNGEAL SEIZURE AS FIRST MANIFESTATION OF A DIVERTICULUM OF THE CERVICAL PART OF THE ESOPHAGUS. (Fr.) Gignoux, M., H. Martin, P. Gadot and B. Gignoux. *Ann. Otolaryngol. Chir. Cervicofac.* 88(4-5):233-234, 1971.

8362 PHARYNGO-ESOPHAGEAL DIVERTICULUM. (Por.) Branco Ribeiro, E. (Sao Lucas Sanit. Sao Paulo, Brazil). *An. Paul. Med. Cir.* 98(2): 85-117, 1971.

8363 TWO CASES OF EARLY ESOPHAGEAL CANCER. (Jap.) Ishigami, K. and M. Hirooka. *Jap. J. Clin. Med.* 29(1):141-148, 1971.

8364 RADIOLOGIC FEATURES OF ESOPHAGEAL DIVERTICULUM. (Rus.) Kolomiichenko, M. I. and L. G. Rozenfeld. *Khirurgiia (Mosk.)* 47(7):135-139, 1971.

8365 CLINICAL FEATURES AND THERAPY OF ESOPHAGEAL DIVERTICULA. (Ger.) Boettcher, I. (Essen Clin., Germany) and V. Kindhauser. *Zentralbl. Chir.* 96(24):793-798, 1971.

8366 MASSIVE HIATAL HERNIA ASSOCIATED WITH GASTROINTESTINAL HEMORRHAGE AND SEVERE SECONDARY ANEMIA. (Rum.) Popescu, M. (Brincovenesc Hosp., Bucharest), E. A. Popescu and L. Stanescu. *Viata Med.* 18(8):359-362, 1971.

8367 A RARE CASE OF LATE PULMONARY COMPLICATION OF HIATAL HERNIA. (Hun.) Trojan, I., J. Imre and F. Kulka. *Tuberk. Tudobet. (Budapest)* 24(3):89-91, 1971.

8368 CURRENT HIATAL HERNIA REPAIRS: SIMILARITIES, MECHANISMS, AND EXTENDED INDICATIONS - AN AUTOPSY STUDY. (E.) Butterfield, W. C. (U. Connecticut Sch. Med., Storrs). *Surgery* 69(6):910-916, 1971.

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8370 A CASE OF EARLY CANCER OF THE THORACIC ESOPHAGUS WITH SMALL LESIONS OF EPITHELIAL DYSPLASIA. (Jap.) Arimori, M. (Keio U., Sch. Med., Tokyo), T. Kakegawa and Y. Kumagai. *Stomach Intest. (Tokyo)* 6(5):559-564, 1971.

8371 A CASE OF EARLY ESOPHAGEAL CANCER. (Jap.) Shigesmatsu, S. (Kanto Rosai Hosp., Kawasaki, Japan), T. Miki and I. Oki. *Stomach Intest. (Tokyo)* 6(5):565-568, 1971.

8372 THREE CASES OF EARLY CARCINOMA OF THE ESOPHAGUS. (Fr.) Christien, G. (24 rue Ducouedic, Lorient, France), G. Bouilland and P. Buquen. *Sem. Hop. Paris* 47(23):1476-1480, 1971.

8373 ANNULAR AND SUBMUCOSAL CARCINOMA OF THE LOWER ESOPHAGUS RESEMBLING MEGA-ESOPHAGUS. (Fr.) Simon, G. C. (Cent. Hosp., Montfermeil, France). *Sem. Hop. Paris* 47(23): 1481-1484, 1971.

8374 BEZOAR OF THE ESOPHAGUS. (Fr.) Gautier Benoit, C. (CHU Gen. Surg. Serv., Lens, France). *Sem. Hop. Paris* 47(23): 1474-1475, 1971.

8375 SURGICAL TREATMENT OF COMPLICATIONS OF ESOPHAGEAL INJURIES UNDER JOINT COLLABORATION OF A SURGEON AND OTOLARYNGOLOGIST. (Cz.) Machacek, M. (Dist. Public Health Inst., Pisek, Czechoslovakia) and J. Manak. *Rozhl. Chir.* 50(6):315-318, 1971.

8376 HEMANGIOMAS OF THE ESOPHAGUS. (E.) Loughry, R. W. *Rocky Mt. Med. J.* 68(7): 37-39, 1971.

8377 ZENKER'S PHARYNGOESOPHAGEAL DIVERTICULUM. (Rum.) Papai, Z. (1st Surg. Clin., Tirgu Mures, Rumania), M. Ionescu, G. Stanciu and R. Lupeanu. *Rev. Med. (Tirgu Mures)* 17(1): 97-99, 1971.

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8379 PERSONAL EXPERIENCE IN THE TREATMENT OF MEGAESOPHAGUS BY HELLER'S OPERATION. (It.) Jovino, R. (U. Naples Inst. Semeiot. Surg., Italy), M. L. Santangelo, A. Renda and B. Buonomo La Rossa. *Rass. Int. Clin. Ter.* 51(3): 148-158, 1971.

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8381 HIATAL HERNIA: DIAGNOSIS, AND INDICATIONS FOR AND RESULTS OF SURGICAL TREATMENT. (Sp.) Sanchez Zinny, J. (J.M. Ramos Mejia Hosp., Buenos Aires, Argentina), J. C. Baccaro, H. Sonez and C. Lopez Fresco. *Prensa Med. Argent.* 58(10): 525-530, 1971.

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8383 SARCOMA OF THE ESOPHAGUS. (Pol.) Majewski, W. (Med. Acad 1st Surg. Clin., Gdansk, Poland) and I. Malowanczyk. *Pol. Przegl. Chir.* 43(6):897-900, 1971.

8384 PROPHYLACTIC CENTRAL SPLENORENAL SHUNT IN THE TREATMENT OF ESOPHAGEAL VARICES AND HYPERSPLENIC THROMBOCYTOPENIA. (Pol.) Jankau, O. (Med. Acad 1st Surg. Clin., Gdansk, Poland), T. Dyk, W. Gacyk and J. Dybicki. *Pol. Tyg. Lek.* 26(21):802-803, 1971.

8385 STENOSING PEPTIC ESOPHAGITIS IN ADULTS. (Fr.) Colin, R. (CHU Clin. Med. Serv., Rouen, France). *Ouest Med.* 24(12):1339-1345, 1971.

8386 LOWER ESOPHAGUS LINED WITH COLUMNAR EPITHELIUM (43 ENDOSCOPIC OBSERVATIONS). (Fr.) Savary, M. (ORL Univ. Clin., Lausanne, Switzerland). *Pract. Otorhinolaryngol.* 33(2): 65-85, 1971.

See also numbers: 8136, 8410, 8504, 8796

8387 EFFECT OF INDOMETHACIN ON DOG GASTRIC MUCOSAL PERMEABILITY. (E.) Cohen, M. M. (Harvard Med. Sch., Boston, Mass.) and W. Silen. *Surg. Forum* 22:313-315, 1971.

Three mongrel dogs with antrectomy and gastrojejunostomy treated 1 month postoperatively with indomethacin (2 mg/kg/day for 6-7 weeks p.o.) showed progressive increase in permeability of the fundic mucosa to H^+ on days 5, 8 and 10 after treatment. Ten weeks after termination of therapy 2 dogs still showed significant increase in mucosal permeability. The results suggest that the therapeutic dose of indomethacin produced chronic irreversible impairment of gastric mucosal barrier to H^+.

8388 HODGKIN'S DISEASE OF THE STOMACH. (E.) Ben-Asher, H. (230 South St., Morristown, N. J.). *Am. J. Gastroenterol.* 56(5):466-471, 1971.

A 42-yr-old woman presented with 10-yr history of nausea, vomiting and epigastric pain. Cholecystectomy revealed acute and chronic cholecystitis and cholelithiasis following which the epigastric pain did not subside. Upper gastrointestinal series showed an esophageal hiatus hernia as well as a 5-cm round mass, with no irregularities or nodularity along the midportion of the greater curvature of the stomach. An ulcer was also found within the mass. At surgical exploration, regional lymph nodes were enlarged and biopsy and frozen section revealed malignant lymphoma after which an 80% subtotal gastrectomy and omentectomy were performed. Microscopically, the mass consisted of a mildly pleomorphic cellular infiltrate of mononuclear reticular cells, small- and medium-sized aggregated lymphocytes, eosinophils and occasional double-nucleated Reed-Sternberg cells. The ulcer was seen to extend into the muscularis mucosae. The pathological diagnosis was Hodgkin's disease of the stomach of the sarcoma type. Following surgery the patient was started on chemotherapy and has improved considerably with no recurrence of pain.

8389 TRITIATED DIGOXIN XVI. GASTRIC ABSORPTION. (E.) Hall, W. H. (VA Little Rock Hosp., Ark.) and J. E. Doherty. *Am. J. Dig. Dis.* 16(10): 903-908, 1971.

Gastric absorption of ^{3}H-digoxin was studied in 13 patients with various gastrointestinal and other diseases by infusing a test meal of 750 ml of 10% glucose, phenol red, and ^{3}H-digoxin. Tritium-labeled digoxin was absorbed in the stomach of 9 of 13 patients independent of acid concentrations found in the residual gastric contents. Digoxin was not absorbed in the stomachs of 2 patients with gastric ulcer, 1 with hiatal hernia, and 1 with pernicious anemia. Gastric-emptying rates did not affect ^{3}H-digoxin absorption in these studies. Thin-layered chromatography revealed that 99% of the radioactivity in the residual gastric contents was in the unchanged digoxin fraction. Although ^{3}H-digoxin was absorbed in the stomach of most patients, this does not seem to be the primary site of digoxin absorption.

8390 THE PREVALENCE AND SIGNIFICANCE OF CIRCULATING ANTIBODIES TO GASTRIC INTRINSIC FACTOR AND PARIETAL CELLS IN GASTRIC CARCINOMA. (E.) Ungar, B. (Roy. Melbourne Hosp., Australia), R. G. Strickland and C. M. Francis. *Gut* 12(11):903-905, 1971.

Subjects consisted of 60 patients with a proven diagnosis of gastric carcinoma while the controls for tests for antibody to intrinsic factor were 500 blood donors and 1100 hospital patients and the controls for antibody to parietal cells were 600 blood donors and apparently healthy elderly subjects. Circulating antibody to gastric intrinsic factor was found in 1 of 23 females with gastric carcinoma and in none of 37 males; in 4 of 800 female controls and in 1 of 800 male controls. Circulating antibody to gastric parietal cells was found in 7 of 23 females, and in 6 of 37 males with gastric carcinoma all of whom were over 60 yr old, and in 41 of 800 female controls and 24 of 800 male controls. In carcinoma patients, antibodies were always found in those over 60 yr old, but 21 of 23 females and 27 of 37 males were in this age bracket. Among controls, 300 females and 300 males were over 60 yr, and 4 of 5 positive for intrinsic factor antibodies were over 60 (4 females, 1 male), while 39 of 65 with parietal cell antibodies were over 60 yr. Using age-matched controls, it was seen that prevalence of either type of antibody was not significantly elevated in carcinoma patients. Reduced levels of serum vitamin B_{12} were observed in all 59 patients tested, including 1 who had been on parenteral vitamin B_{12} for pernicious anemia diagnosed elsewhere 10 yr prior to the diagnosis of gastric carcinoma.

8391 PYLORIC STENOSIS: FATHER AND TWO SONS. (E.) Meyer, B. P. (Ohio State U. Child. Hosp., Columbus) and R. Johnsonbaugh. *Pediatrics* 48(5):826-827, 1971.

Pyloric stenosis occurred in a family with the father and first 2 offspring sons being affected. The patients were first seen at the hospital with a history of projectile vomiting within 5 weeks of their births. In all 3 instances a pyloric tumor was found at laparotomy, and in the father's case a Ramstedt procedure was performed, while both siblings underwent pyloromyotomy. In the father and 1 sibling the recovery was uneventful while the other son had small amounts of emesis with each feeding for a period of 3 days; no recurrence has occurred.

8392 DUODENAL OBSTRUCTION - AN UNUSUAL COMPLICATION OF A GASTROSTOMY FEEDING CATHETER. (E.) Goodman, L. R. (Boston City Hosp., Mass.), J. Wittenberg and R. Messer. *Br. J. Radiol.* 44(527):883-884, 1971.

During the fourth week following gastrostomy, a 79-yr-old male patient experienced intermittent eructation, bloating, constipation and occasional postprandial vomiting. On day 35, a plain film of the abdomen revealed a 3.5-cm soft tissue density to the right of the second lumbar vertebra. No gastric dilatation was noted, but a barium swallow demonstrated a large filling defect at the base of the duodenal bulb. Barium injected into the gastrostrostomy tube entered into the duodenum directly. Herniation of a gastrostomy tube into the duodenum, although an easily correctable complication, can result in significant morbidity and occasional mortality if unrecognized. To avoid the complication when the catheter is placed in the stomach, the balloon should be inflated and the tube gently retracted until the resistance of the anterior abdominal wall is met. The tube can then be marked with an indelible marker or wrapped with tape at the skin surface.

8393 GASTRIC OPERATION FOR OBESITY, FIVE-YEAR FOLLOW-UP. (E.) Foley, T. M., Jr. (U. Iowa Coll. Med., Iowa City) and E. E. Mason. *Surg. Forum* 22:311-312, 1971.

A gastric bypass similar to subtotal gastric resection was performed on 75 obese or duodenal ulcer patients over a 5-yr period; 2 died of peritonitis and 2 from pulmonary embolism; 15 had a weight loss of 68 kg or more. Subsequently 30 of these patients underwent a gastroplasty. One-fourth of the operations included cholecystectomy; 16 patients had panniculectomy after weight loss; redundant skin from the upper arms was removed from 2, breast tissue from 2, and large folds of the thigh from 1. Bypass was performed on 8 patients with duodenal ulcer, 1 of whom was obese; 2 of the thin patients developed stomal ulcers and required subsequent vagotomy and gastric resection; 1 obese patient required vagotomy and resection of the excluded stomach for stomach ulcer. Indwelling fasting fundic pH below 3 before bypass surgery was noted in 82% of obese patients, in 67% during the first yr after bypass and in 60% of those studied for more than 1 yr after bypass. Bypass surgery is recommended for treatment of extreme obesity since it is not an ulcerogenic procedure.

8394 PSYCHOSOMATIC ASPECTS OF INFANTILE PYLORIC STENOSIS. (E.) Dodge, J. A. (Queens U. Inst. Clin. Sci., Belfast, Ireland). *J. Psychosom. Res.* 16(1):1-5, 1972.

As part of a wider follow-up study, inquiries were made of the mothers of 394 Belfast children who had operations for infantile pyloric stenosis concerning adverse social, domestic or emotional circumstances during pregnancy. There were 134 mothers who reported some degree of stress during the last trimester of pregnancy and of these about 95 were in the severe or definite stress category. The nature of the problems included bereavement or serious illness in a parent, husband or child (31), previous troubled pregnancy (20), severe marital difficulties (30) and mental illness or depression (25). A high proportion of control mothers who experienced stress in late pregnancy gave birth to children who suffered from troublesome undiagnosed vomiting during pregnancy. Possibly a psychosomatic mechanism operates by which a humoral factor, perhaps gastrin, is transmitted from mother to fetus, causing subsequent pyloric hypertrophy.

8395 DISULPHIDE GROUPS IN PANETH CELL GRANULES OF ENTEROID METAPLASIA IN CHRONIC GASTRITIS. (E.) Montero, C. (Social Security City Sanit., Sevilla, Spain) and J. M. Loizaga. *Histochem. J.* 3(5):399-402, 1971.

With the assumption that no sulfhydryl groups existed in Paneth cell granules of enteroid metaplasia in chronic gastritis, the possible existence of disulfide groups was investigated. Adam's technique was applied, in which a ferric ferricyanide treatment was preceded by a reducing step with sodium thioglycollate at pH 8.0. A mercury orange method and a dihydroxydinaphthyldisulfide method were also reinvestigated using the preliminary reducing step. Positive reactions were obtained in all cases. For controls the sulfhydryl groups obtained by the reduction step were blocked with mercuric chloride or N-ethylmalemide; no staining was obtained with any of the methods used, except in the case of dihydroxydinaphthyldisulfide reaction. Since no staining occurred with the 3 standard methods tested when applied without a previous reduction step, it appears that there are no sulfhydryl groups in the material.

8396 BONE METASTASIS OF CANCER OF THE GASTRIC ANTRAL REGION. (Rus.) Tiazhina, S. M., L. L. Shafranskii, D. B. Dzhumabaeva and M. I. Aimagambetova. *Klin. Med. (Mosk.)* 49(6):143-145, 1971.

8397 SYMPTOMATOLOGY OF SARCOMA OF THE STOMACH. (Rus.) Talalaeva, A. V. and I. I. Gritsman. *Klin. Med. (Mosk.)* 49(6):126-130, 1971.

8398 PHYTOBEZOARS OF THE STOMACH. (Rus.) Nadzharov, A. G., T. T. Aslanov and I. T. Abasov. *Klin. Med. (Mosk.)* 49(6):80-85, 1971.

8399 MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE LIVER IN PATIENTS WITH GASTRIC

CANCER BEFORE AND AFTER GASTRECTOMY (ACCORDING TO DATA OF TRANSCUTANEOUS BIOPSY OF THE LIVER). (Rus.) Tsekhanovich, T. I. and N. M. Tikhonova. *Klin. Med. (Mosk.)* 49(6):61-66, 1971.

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See also numbers: 8140, 8289, 8290, 8291, 8564, 8565, 8566, 8567, 8819, 8908

8477 CALCIUM CARBONATE ANTACID AND SERUM GASTRIN CONCENTRATION IN DUODENAL ULCER. (E.) Reeder, D. D. (U. Texas Med. Branch, Galveston), J. L. Conlee and J. C. Thompson. *Surg. Forum* 22:308-310, 1971.

Calcium carbonate ($CaCO_3$; 2 g/kg p.o. at 1-hr intervals) caused significant increase of serum concentrations of gastrin, and stimulated acid secretion in 12 patients with duodenal ulcer, whereas sodium bicarbonate (2 g/kg p.o.) was ineffective. No change in serum calcium levels was noted. The results suggest that the change in gastrin levels was caused by the action of calcium on the gastrin release mechanism in the antrum.

8478 THE PROPHYLACTIC EFFECT OF AN ELEMENTAL DIET ON PORCINE STRESS. (E.) Voitk, A. J. (McGill U. Surg. Clin., Montreal, Quebec, Canada), C.-J. Chiu and F. N. Gurg. *Surg. Forum* 22:328-329, 1971.

Ten young pigs were fed a standard commercial pig ration containing whole protein for 3 days, while a similar experimental (diet) group of 10 pigs was fed a diet in which the protein component consisted of an enzymatic hydrolysate of casein. Paired pigs were subjected to laparotomy, followed by hemorrhagic shock, induced by withdrawing blood, which was citrated and reinfused 3 hr after the onset of shock. The animals were sacrificed 3 hr later and the stomachs examined grossly and histologically for lesions. Gross evidence of gastric stress ulcers was found in 9 of the 10 control animals, but in only 2 of the 10 diet animals. The lesions were evenly divided between the body and antrum of the stomach, often occurring in both, and tended to be larger and more numerous in the controls. The reason for the protective effect of the casein hydrolysate diet is unexplained.

8479 THE EFFECT OF VITAMIN A ON THE FORMATION OF STEROID INDUCED GASTRIC ULCERS. (E.) Hutcher, N. (Med. Coll. Virginia, Richmond), S. G. Silverberg and H. M. Lee. *Surg. Forum* 22:322-324, 1971.

Female rats were fasted 4 days (except for water), and during this time they received daily i.m. injections of normal saline, vitamin A (20,000 - 200,000 U/kg) and methylprednisolone acetate (50 - 80 mg/kg), alone, or in various combinations. All animals were sacrificed on the fifth day, and the glandular portions of their stomachs were removed and examined grossly and histologically for ulcers. None of the rats treated with saline or vitamin A alone developed ulcers. Rats treated with methylprednisolone alone developed multiple ulcers, the number of which appeared to be dose-related. The gastric mucosa showed nearly complete loss of mucoid substances upon microscopic examination. Vitamin A in all doses tested reduced the number of ulcers in rats simultaneously treated with methylprednisolone. The loss of mucoid substances was diminished, but not completely prevented by Vitamin A in these animals.

8480 STUDIES ON THE PATHOGENESIS OF BENIGN GASTRIC ULCER: INCREASED "BACK DIFFUSION" OF $[H^+]$ IN EXPERIMENTAL ATROPHIC GASTRITIS. (E.) Ritchie, W. P., Jr., B. Butler and J. P. Delaney. *Surg. Forum* 22:330-331, 1971.

A vagally denervated pouch of full thickness gastric wall was prepared from the greater curvature of the stomach and interposed into the proximal jejunum in 5 dogs. After 5 - 7 months, the pouch mucosa showed morphological characteristics at atrophic gastritis. Similar pouches were constructed and drained by a Roux-en-Y limb of jejunum in 5 other dogs. After 3 to 4 weeks, these pouches were histologically normal. Under anesthesia, a precise volume of a test solution consisting of HCl (80 mM/liter), NaCl (70 mM/liter) and ^{24}Na (3-5 microcuries/liter) was introduced into the pouches through cannulae. After 30 min, the mean acid output was 63 ± 16 microequivalents in the gastritic pouches, and 446 ± 214 microequivalents in the normal pouches. There were no significant differences in mucosal temperature, arterial pH, pO_2, pCO_2, sodium and potassium ion concentrations, osmolarity, cardiac output and mean arterial blood pressure. Results indicate that gastritic mucosa permits greater "back diffusion" of H^+ than does normal mucosa.

8481 SERUM GASTRIN IN DUODENAL ULCER. PART I. BASAL LEVELS AND EFFECT OF FOOD AND ATROPINE. (E.) Korman, M. G. (Monash U. Dept. Med., Melbourne, Australia), C. Soveny and J. Hansky. *Gut* 12(11):899-902, 1971.

After an overnight fast, radioimmunoassay of serum for fasting gastrin levels showed a mean of 32.1 p/ml in 93 normals (range 0-300); 15.7 pg/ml in 72 patients with duodenal ulcers (range 0-44); 118 pg/ml in 18 patients with gastric ulcers (range 36-330) and 450 to 2000 pg/ml in 7 patients with Zollinger-Ellison syndrome. The mean (range) basal gastric pH in these groups was 3.7 (1.3-7.8); 1.5 (1.1-2.2), 4.2 (2.2-6.8) and less than 1.3, resp. The mean ages in these groups was 40.3, 44.2, 57.7 and 49 yr, resp. In 5 patients with duodenal ulcers, after a high protein meal alone, serum gastrin levels rose significantly from a mean basal level of 17 pg/ml to 94 pg/ml at 45 min with a gradual fall to normal; when the high protein meal followed a single injection of atropine by 30 min, the serum gastrin levels rose significantly from a mean basal level of 15 pg/ml to 122 pg/ml at 75 min. The response to atropine alone did not differ from the basal level. Without prior atropinization, there were no significant increases in response to p.o. distilled water (from 2-6 pg/ml), glucose (4-9 pg/ml) or cream (8-16 pg/ml), while prior atropinization caused a nonsignificant increase in the response to glucose (from 7-13 pg/ml) and cream (from 7-20 pg/ml).

8482 THE QUESTION OF BILE REGURGITATION AS A CAUSE OF GASTRIC ULCER. (E.) Dragstedt, L. R. (U. Florida Dept. Surg., Gainesville), E. R. Woodward, T. Seito, J. Isaza, J. R. Rodriguez and R. Samiian. *Ann. Surg.* 174(4):548-559, 1971.

Dogs were subjected to a McCann procedure modified so that bile, pancreatic and duodenal juice were diverted into the lower portion of the stomach instead of into the fundus, and the distal end of the divided duodenum, instead of jejunum, was anastomosed end-to-end with the pyloric end of the stomach. The dogs underwent this modified procedure either alone, or accompanied by bilateral vagotomy, truncal vagotomy and antral resection, or diversion of the bile and pancreatic juice into the esophagus. With diversion of bile and pancreatic juice into the stomach there were jejunal ulcers in the efferent loop. With diversion by a short duodenal conduit, there were no ulcers in the stomach or at the afferent or efferent stomas. In the presence of vagotomy and antral resection ulcers also failed to develop. With diversion of bile and pancreatic juice into the esophagus by a short duodenal conduit, there were no ulcers in the esophagus or stomach, but they did occur at the efferent anastomosis with the pylorus in 17% of dogs. With esophageal diversion through a long duodenal-jejunal conduit, there were no ulcers in the esophagus or stomach, but they did develop in the jejunum at the efferent anastomosis with the pylorus in 86%.

8483 EFFECT OF PEPSTATIN ON ACID PROTEASES. (E.) Aoyagi, T. (Inst. Microb. Chem., Tokyo), S. Kunimoto, H. Morishima, T. Takeuchi and H. Umezawa. *J. Antibiot. (Tokyo)* 24(10):687-694, 1971.

The effects of pepstatin (an amino acid from actinomycetes culture broth) on acid proteases was studied in vitro, and in 9 patients with gastric ulcers. Pepstatin strongly inhibited type B (but not A) of Aspergillus niger and the acid proteases of Trametes sanguinea, Aspergillus saitoi, and Xylaria sp., the inhibition being greater with hemoglobin as the substrate than with casein. The esters of pepstatin were equally or slightly more active than pepstatin. Pepstatin showed equal inhibitory activity on human, porcine and rat proteases. Both the pepsin and gastricsin obtained from human gastric juice were inhibited by pepstatin, but gastricsin was about 100 times more resistant to inhibition. The residual pepstatin content in the gastric juice of 9 gastric ulcer patients at 60 min after the administration of 1 or 2 capsules of 50 mg pepstatin were determined. The observed pepstatin concentration 60 min after administration was sufficient to inhibit pepsin activity, the peptic activity being 0 - 9.8% of that in the juice collected before administration. Pepstatin also produced a marked decrease of bound sialic acid in the gastric juice in pylorus-ligated rats and in the protein concentration of human gastric juice.

8484 INHIBITION OF PENTAGASTRIN-STIMULATED GASTRIC SECRETION BY DUODENAL ACIDIFICATION OR ADMINISTRATION OF FAT IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER. (E.) Bochenek, W. (Albany Med. Coll., N. Y.), J. B. Rodgers, Jr. and J. A. Balint. *Am. J. Dig. Dis.* 16(10):865-872, 1971.

In 10 normal subjects and 7 patients with duodenal ulcer, maximal inhibition of continuous pentagastrin-stimulated HCl output occurred in the first sample taken 15 min after intraduodenal acid infusion. Mean HCl output, during the entire period of acid infusion (60-120 min), was lower in ulcer patients than in corresponding control experiments. Postinfusion HCl output rose to control levels in the normal subjects, but remained significantly lower in ulcer patients. Pepsin output, although lower during the first 15 min of duodenal acidification, later increased. A slow, regular decline of acid and pepsin output was observed in 8 normals and in 7 ulcer patients, reaching the maximum of inhibition in the 105-120 min sample, that is, 45-60 min after the beginning of fat infusion. Acid and particularly pepsin secretion was inhibited to a greater extent in ulcer patients. Secretin, probably responsible for inhibition after duodenal acidification, is not involved in the inhibition by fat. Ulcer patients have unimpaired mechanisms of inhibition by acid and fat.

8485 A CONTROLLED CLINICAL TRIAL OF CHOLESTYRAMINE IN THE TREATMENT OF GASTRIC ULCER. (E.) Black, R. B., J. Rhodes (Cardiff Roy. Infirm., Wales), G. T. Davies, H. Gravelle and P. Sweetnam. *Gastroenterology* 61(6):821-825, 1971.

The effect of cholestyramine (12 g/day for 1 or 2 months) on the rate of healing of gastric ulcers in 35 patients was studied in a double-blind clinical trial to examine the significance of bile reflux in gastric ulcer. After 2 months the number of patients with a healed ulcer was similar in the 2 groups; however, the mean percentage reduction in ulcer size was slightly greater in the cholestyramine than in the placebo group. No significant differences were seen between the groups regarding symptoms, but the consumption of antacid was greater in the placebo group. The occurrence of loss of appetite, nausea, and constipation was similar in the 2 groups. Thus, the effectiveness of cholestyramine in healing gastric ulcers was not demonstrated conclusively.

8486 SUCCESSFUL TREATMENT BY VAGOTOMY OF 2 PATIENTS WITH PEPTIC ULCER AND STOKES-ADAMS (VASOVAGAL) SYNCOPE. (E.) Obel, P. I. W. (U. Witwatersrand Dept. Med., Johannesburg, South Africa) and P. Marchang. *Am. J. Cardiol.* 28(6): 731-734, 1971.

Cases of 2 patients were reported in whom removal of abnormal visceral stimuli by truncal vagotomy resulted in the cure of apparently vagally-mediated Stokes-Adams episodes. One patient has been free of syncope for 7 yr, and the other for almost 3 yr, whereas previously the episodes were frequent, disabling and unresponsive to therapy. Hollander tests showed that the vagotomy was complete in each case, and results suggest that peptic ulceration can reflexly cause total cardiac stanstill and that the vagus nerve is the pathway of stimulation. Thus a double role of the vagus nerve in the genesis of Stokes' Adams syncope associated with infradiaphragmatic disease has been illustrated. The efferent limit was manifest by the unusual finding of S-A block being followed by total cardiac standstill and syncope. The sequence of development of arhythmias in one case also strongly suggests excessive parasympathetic efferent activity. The role of the vagus in carrying afferent impulses is demonstrated by the salutary effect of infracardiac vagal section.

8487 PSYCHIATRIC SYMPTOMS AND PERSONALITY TRAITS IN PATIENTS SUFFERING FROM GASTROINTESTINAL ILLNESS. (E.) Philip, A. E. (Edinburgh U. Dept. Psychiatr., Scotland) and E. L. Cay. *J. Psychosom. Res.* 16(1):47-51, 1972.

The psychopathology of a group of patients admitted to a gastrointestinal unit for treatment of peptic ulcer and other complaints was investigated. Psychiatric symptoms were present in 61% of 28 peptic ulcer patients; symptoms of anxiety and depression were common. However, peptic ulcer patients did not have more psychopathology than those with other illnesses. Personality testing revealed that these patients were less emotionally stable, more restrained, less venturesome, more self-sufficient and less group-minded than controls. Although these differences were not very marked, they do suggest that in these patients there is a turning of attention towards the self and away from other oriented activity. No evidence was found for a peptic ulcer personality. Patients being studied before definitive treatment should be assessed both physically and psychiatrically.

8488 VERTICAL PYLORECTOMY IN THE TREATMENT OF DUODENAL ULCER. JUDD'S ANTERIOR DUODENOSPHINCTEROTOMY. (E.) Soler Roig, J. (San Pablo Hosp., Barcelona, Spain). *J. Abdom. Surg.* 13(5):99-101, 1971.

8489 EFFECT OF TESTOSTERONE AND MEPROBAMATE ON THE GASTRIC ACIDITY AND PEPTIC ULCERATION. (E.) Chandra, D. (Gandhi Med. Coll., Bhopal, India), S. S. Gupta and A. W. Bhagwatt. *Indian J. Med. Res.* 59(4):609-613, 1971.

8490 GASTRIC PATHOLOGY IN ELDERLY PATIENTS AFTER GASTRIC RESECTION FOR PEPTIC ULCER. (It.) Finzi, B. (G.B. Giustinian Geriatr. Hosp., Venice, Italy). *G. Gerontol.* 19(3):159-165, 1971.

8491 CHOLEDOCHODUODENAL FISTULA DUE TO PEPTIC ULCER. (Fr.) Cornet, L. (Sch. Med., Abidjan, Ivory Coast), Y. Angate and J. K. Kekeh. *Chirurgie* 97(8):570-580, 1971.

8492 ACUTE PERFORATION OF PEPTIC ULCER. (E.) Kumar Ghose, N. (Sambhu Nath Pandit Hosp., Calcutta, India). *J. Indian Med. Assoc.* 56(10):304-309, 1971.

8493 COEXISTING GASTRIC AND DUODENAL ULCERS. (Pol.) Kulicz, A. (Med. Acad. 3rd Surg. Clin., Bytom, Poland), J. Gryglicki and A. Rechlewicz. *Pol. Tyg. Lek.* 26(26):994-996, 1971.

8494 RESULTS OF TREATMENT OF CASES OF PERFORATION OF GASTRIC AND DUODENAL ULCERS SEEN IN 10 YEARS. (Hun.) Bodnar, A. and I. Fazekas. *Magy. Sebesz.* 24(3):167-174, 1971.

8495 RATIONAL DATA AND CRITERIA IN THE DIFFERENTIAL SURGERY FOR GASTRODUODENAL ULCERS. (Fr.) Alexiu, O. (Babes Hosp., Bucharest, Rumania), B. Furtunescu and E. Pacescu. *Lyon Chir.* 67(2):96-98, 1971.

8496 POSTOPERATIVE ULCERS FOLLOWING VAGOTOMY AND PYLOROPLASTY. (Fr.) Combemale, B. (City Hosp., Lille, France), G. Depadt and G. Lagache. *Lille Med.* 16(3):442-444, 1971.

8497 FUNCTIONAL STATE OF THE ADRENAL CORTEX IN PATIENTS WITH COMPLICATED FORMS OF PEPTIC ULCER. (Rus.) Govdenko, P. F. *Klin. Khir.* 51(5):62-66, 1971.

8498 PEPTIC ULCERS OF THE JEJUNUM (CLINICAL AND MORPHOLOGICAL STUDY). (Rus.) Kuzin, M. I., M. A. Chistova, L. I. Aruin and L. V. Chistov. *Khirurgiia (Mosk.)* 47(7):24-33, 1971.

8499 SOME ELECTRON MICROSCOPIC OBSERVATIONS ON THE REGENERATING MUCOSA OF EXPERIMENTAL GASTRIC ULCER (SO-CALLED CLAMPING METHODS) IN RATS. (Jap.) Imai, K. (Tokyo Med. Coll.). *Nippon Shokakibyo Gakkai Zasshi (Jap. J. Gastroenterol.)* 68(3):176-195, 1971.

8500 PERFORATING ULCER OF THE STOMACH AND DUODENUM. (Cz.) Fedinec, A. V. (Uzgorod State U., USSR), I. J. Korsinskij and S. S. Dolgos. *Cesk. Gastroenterol. Vyz.* 25(4): 144-146, 1971.

8501 TREATMENT OF PEPTIC ULCER AND OUTLOOK FOR THE FUTURE. (Cz.) Jirasek, V. (Charles U. Sch. Gen. Med., Prague). *Cesk. Gastroenterol. Vyz* 25(4):155-163, 1971.

8502 GASTRIN AND ITS IMPLICATIONS IN THE MANAGEMENT OF PEPTIC ULCER. (E.) Gillespie, I. E. (U. Manchester Dept. Surg., England). *DM* August:1-41, 1971.

8503 PATHOPHYSIOLOGY OF THE STOMACH RESECTED BY THE BILLROTH II PROCEDURE. FOLLOW-UP STUDIES ON 1200 PATIENTS. (Ger.) Theisinger, W. (Tech. U. Munich Isar Clin., Germany). *Fortschr. Med.* 89(16):693-695, 1971.

8504 ESOPHAGEAL ACHALASIA AND PEPTIC ULCER. (Heb.) Reiss, R. (Meir Hosp., Kfar Saba, Israel). *Harefuah* 80(6):314-316, 1971.

8505 PEPTIC ULCER IN THE COURSE OF HERNIAS AND EVENTRATIONS OF THE DIAPHRAGM. (Fr.) Cornet, M. A. (Laennec Hosp., Paris). *J. Med. Chir. Prat.* 142(13):498-504, 1971.

8506 VAGOTOMY VERSUS GASTRECTOMY. (Fr.) Lagrot, F. and J. Perrotin. *J. Chir. (Paris)* 101(3):331-338, 1971.

8507 TREATMENT OF PERFORATED DUODENAL ULCER BY VAGOTOMY AND PYLOROPLASTY. (E.) Wysocki, A. (Med. Acad. Dept. Surg., Cracow, Poland) and W. Czechowicz. *J. Abdom. Surg.* 13(6):132-133, 1971.

8508 TREATMENT OF PERFORATED GASTRODUODENAL ULCER. (Rus.) Kuznetsov, N. N. and P. F. Karpov. *Vestn. Khir.* 107(7):22-24, 1971.

8509 THE ACID SECRETION IN DUODENAL ULCER AND PSEUDO-ULCER SYNDROME. (Dan.) Nielsen, V. G. (Natl. Hosp., Copenhagen) and B. Jorgensen. *Ugeskr. Laeger* 133(21):1025-1027, 1971.

8510 TOTAL VAGOTOMY AND PYLOROPLASTY BY WEINBERG'S METHOD AS THE OPERATION OF CHOICE IN 190 PATIENTS WITH DUODENAL ULCER. (Dan.) La Cour Andersen, J. (Sundby Hosp., Copenhagen), B. Clausen and M. Moller Hansen. *Ugeskr. Laeger* 133(20):975-979, 1971.

8511 GASTRIC RESECTION FOR DUODENAL ULCER. (E.) Postlethwait, R. W. (Duke U. Med. Ctr., Durham, N. C.) and M. L. Dillon. *Surgery* 69(6):829-831, 1971.

8512 EVALUATION OF SURGERY FOR COMPLICATED PEPTIC ULCER AND PREVENTION OF DUMPING SYNDROME. (Rus.) Udod, V. M., A. M. Antonov and V. A. Maltsev. *Sov. Med.* 34(6):108-112, 1971.

8513 REACTIVATION OF A DUODENAL ULCER AFTER TECHNICALLY IMPERFECT VAGOTOMY AND PYLOROPLASTY. (Fr.) Roux, M. (Vaugirard Hosp., Paris) and L. Debbasch. *Sem. Hop. Paris* 47(23): 1505-1506, 1971.

8514 ACUTE HEMORRHAGIC MUCOSAL ULCER OF THE SECOND PART OF THE DUODENUM. (Fr.) Lagadec, B. (Saint Antoine Hosp., Paris), B. Fouet and M. Hivet. *Sem. Hop. Paris* 47(23): 1501-1504, 1971.

8515 EVALUATION OF THE RESULTS OF TREATMENT OF DUODENAL ULCER BY MEANS OF VAGOTOMY AND PLASTIC RECONSTRUCTION OF THE PYLORUS IN THE SURGICAL DIVISION OF THE MUNICIPAL HOSPITAL AT TARNOW. (Pol.) Gontaszewski, A. (Reg. Hosp., Tarnow, Poland) and A. Ruda. *Przegl. Lek.* 27(5): 368-370, 1971.

8516 USE OF ELECTROSPLANCHNOGRAPHY IN THE PREOPERATIVE DIAGNOSIS OF GASTRIC ULCERATION. (Fr.) Martin, A. (Bretonneau Hosp., Tonnelle, France), J. Moline and J. Murat. *Presse Med.* 79(28):1277-1278, 1971.

8517 DISTRIBUTION OF ABO BLOOD GROUPS AND PRESENCE OF GROUP SUBSTANCES IN THE SALIVA OF PATIENTS WITH GASTRIC AND DUODENAL ULCER. (Pol.) Belec, C. (Milit. Med. Acad., Lodz, Poland), J. R. Chojnowski, F. Tkaczyk and L. Zydowicz. *Pol. Arch. Med. Wewn.* 46(5):557-562, 1971.

8518 GASTRITIS AND GASTRIC ULCER. (Fr.) Aukee, S. and M. Siurala. *Med. Hyg. (Geneve)* 29(948):125, 1971.

See also number: 8931

8519 ENDOCRINE TUMOUR IN KIDNEY AFFECTING SMALL BOWEL STRUCTURE, MOTILITY, AND ABSORPTIVE FUNCTION. (E.) Gleeson, M. H., S. R. Bloom, J. M. Polak, K. Henry and R. H. Dowling (Roy. Postgrad. Med. Sch., London). *Gut* 12(10): 773-782, 1971.

A 44-yr-old woman presented in September of 1969 with polyuria and nocturia of 1 yr duration, worsening constipation of many yr duration, generalized increasing edema for 3 months, nausea and vomiting for 3 weeks, amenorrhea, alopecia, and a transient erythematous skin rash. Physical examination and clinical studies revealed abnormalities of small intestinal morphology, motility, and absorptive function. Laparotomy in January, 1970 revealed marked hypertrophy and edema of the small intestine. A recurrent urinary tract infection prompted an i.v. pyelogram that revealed a distorted calyceal pattern of the right kidney. On April 2, a right-sided nephrectomy revealed a slow-growing endocrine tumor. The tumor stained positively for tryptophan, glucagon, and amine precursor uptake and decarboxylation criteria. Previous symptoms and intestinal abnormalities disappeared. A review of the literature revealed that some of the patients' symptoms had been reported previously in the rare cases of glucagonomas. The small intestine changes had not been reported previously. It is postulated that glucagon has a direct effect on villous hypertrophy by increasing blood flow or that a second unidentified hormone stimulated villous growth. The lack of motility could have been a direct effect on jejunal and colon motility or may have reflected glucagon's antagonism to exocrine pancreatic secretions.

8520 ACUTE AND CHRONIC MAGNESIUM DEFICIENCY FOLLOWING EXTENSIVE SMALL GUT RESECTION. (E.) Nielsen, J. A. (Aalborg Hosp. North, Denmark) and E. H. Thaysen. *Scand. J. Gastroenterol.* 6(7):663-666, 1971.

A case is reported of a 56-yr-old woman admitted with acute gastroenteritis, whose only history of gastrointestinal disease had been a cholecystectomy 15 yr previously. Laparotomy 3 days after admission revealed marked congestion and slight edema of almost the entire small intestine and abundant peritoneal exudate. Two days later she showed signs of shock and of an adynamic ileus. An emergency reexploration revealed a gangrenous small intestine, which was resected, leaving behind only the duodenum, 40 cm of proximal jejunum and 15 cm of terminal ileum. Histologically, there were widespread occlusions of the mesenteric arteries and hemorrhagic infarction of the small intestine. She was started on p.o. alimentation 6 days postoperatively and, for several weeks, continued to have intractable watery diarrhea, associated with hypokalemia, hypocalcemia and water dehydration. Her sensorium was clouded, paresthesias and muscular twitching developed and at 6 weeks postoperatively the serum magnesium was 0.8 mEq/liter. After 1 week on parenteral magnesium her serum levels of magnesium, potassium and calcium returned to normal, her neurological status improved and her watery diarrhea subsided. Parenteral magnesium was replaced with p.o. magnesium acetate. She was discharged 1 month later, still underweight, with 2-3 bulky fatty stools per day. She was maintained on 80 mEq/liter magnesium equivalent per day p.o., p.o. water-soluble preparations of vitamins A and D, and vitamin B_{12} injections, and has been well on this replacement regimen for 3 yr.

8521 THE ENTEROHEPATIC CIRCULATION OF BILE SALTS IN GASTROINTESTINAL DISORDERS. (E.) Garbutt, J. T. (Duke U. Med. Ctr., Durham, N. C.), L. Lack and M. P. Tyor. *Am. J. Med.* 51(5):627-636, 1971.

Patients with surgically created ileal dysfunction or diffuse ileal disease had markedly reduced enterohepatic circulation of conjugated bile salts when isotope and intraluminal studies were performed. The circulation appeared intact in patients with duodenojejunal disorders. The patients with ileal disorders lost some 6 to 9 enterohepatic cycles in 24 hr. A compensatory contribution to the total bile acid pool may be made by microorganisms, particularly bacterioides species. A marked increase in the glycine to taurine ratio was noted and led to hyperoxaluria and renal stones. Oral ingestion of taurine inhibited this. Oral bile salts controlled steatorrhea but increased watery diarrhea. Substitution of dietary short-chain fatty acids and intraluminal binding with cholestyramine were effective in reducing fecal volume. Steatorrhea also resulted from bacterial overgrowth in the proximal intestine due to the inhibition of micellarization.

8522 PROTECTION OF THE ISCHEMIC INTESTINE WITH INTRALUMINAL GLUCOSE. (E.) Chiu, C.-J. (McGill U. Surg. Clin., Montreal, Quebec, Canada), A. H. McArdle and F. N. Gurd. *Surg. Forum* 22:44-46, 1971.

In 6 anesthetized dogs, the superior mesenteric artery was clamped and isotonic radioactive glucose or isosmotic radioactive methylglucose was introduced into multiple ileal sacs, to determine if glucose is utilized as a substrate, while it provides mucosal protection from ischemic damage. Since methylglucose cannot be utilized by the cells, lactate values in these sacs represented endogenous lactate production. Lactate values were significantly higher in both the tissue and luminal fluid from the glucose-containing sacs than in tissue and luminal fluid from methylglucose-containing sacs. The lactate in the glucose sacs was radioactive, indicating that the lumen glucose had been utilized as a metabolic substrate. After mesenteric circulation was restored, tissues containing the glucose showed increased morphologic and functional recovery.

8523 DUODENAL DIAPHRAGM. (E.) Bilton, J. L. (Huron Rd. Hosp., Cleveland, Ohio) and S. Yap. *Am. J. Gastroenterol.* 56(5):457-462, 1971.

Duodenal diaphragm, a web-like formation in the second portion of the duodenum in the region of the ampulla of Vater, is discussed. This disease is more common in children but may appear at any age, even as late as the seventh decade. The symptoms are high intestinal obstruction, persistent vomiting, epigastric distention, visual peristalsis and icterus. Diagnosis in the newborn is suspected with the presence of projectile vomiting and must be differentiated from esophageal atresia and pyloric obstruction. In the adult, the diagnosis is rarely made preoperatively and usually follows a history of indigestion with vomiting, epigastric distention and weight loss. X-ray findings are very helpful in both infant and adult. Two case reports are presented. In the first case, the diaphragm was located high in the duodenum and was associated with much fibrosis and chronic inflammatory changes. In the second case, the diaphragm was low in the second portion of the duodenum and devoid of inflammation. Treatment of this condition is controversial but consists mainly of simple excision, duodenojejunostomy, vagotomy, gastrojejunostomy or resection. Results and prognosis were good in both cases presented, and seem good generally.

8524 PEUTZ-JEGHERS SYNDROME. INVOLVEMENT OF THE GASTROINTESTINAL AND UPPER RESPIRATORY TRACTS. (E.) Jancu, J. (Cent. Emek Hosp., Afula, Israel). *Am. J. Gastroenterol.* 56(6):545-549, 1971.

A 31-year-old male patient with Peutz-Jeghers syndrome with polyps present in the stomach, small intestine and colon as well as in the maxillary antrum and nasal choanae is presented. A polyp which was located 60 cm from the duodenojejunal flexure within a jejunojejunal intussusception recurred within 1 yr after its removal. All of the polyps which were surgically removed during the course of the patient's illness proved to be benign adenomas. The patient had pigmentation of the eye, lips, hands and feet, which became more prominent with time. No hereditary factor could be identified in this patient. This is the second case of Peutz-Jeghers syndrome reported in the Middle East.

8525 THE AETIOLOGY OF NECROTISING ENTERITIS IN THE NEWBORN. (E.) Drainer, I. K. (Roy. Hosp. Sick Child., Glasgow, Scotland) and J. M. Anderson. *Z. Kinderchir.* 10(3/4):379-390, 1971.

Four of 10 newborn patients with necrotizing enteritis were treated surgically, with 2 survivals. Diagnosis was made in the remainder, either when the child was too ill for surgery, or at autopsy. Some perinatal abnormality was elicited in all 10 cases with 6 of the babies being premature or dysmature; severe asphyxia was noted in 7 cases. The maternal history was abnormal in 5 cases. Periods of good health ranging from 1 to 6 days were noted. The babies then suddenly became ill. Symptoms included abdominal distention, vomiting which rapidly became bilious, grunting respirations, cyanosis, peripheral circulatory failure, rectal passage of fresh blood and, commonly, hypothermia. X-ray confirmation in this study revealed 6 cases of distended gas-filled loops, 5 cases with fluid level and 1 case of pneumoperitoneum. One X-ray was normal and 3 children were not X-rayed. The role of gram-negative endotoxins, Schwartzman reaction, lysozyme deficiency, shunting of blood from the splanchnic bed, and reflex arteriolar or renular spasm is discussed. Consideration of these factors with prompt surgical intervention should be used to reduce mortality.

8526 MUCOSAL ARCHITECTURE OF THE SMALL BOWEL IN CASES OF PSORIASIS. (E.) Barry, R. E. (Bristol Roy. Infirm., England), P. R. Salmon, A. E. Read and R. P. Warin. *Gut* 12(11): 873-877, 1971.

Subjects consisted of 22 patients with psoriasis covering more than 50% of their body surface; 20 normals age-matched with those with psoriasis, admitted for evaluation of vague abdominal symptoms, in whom all tests of small intestine function were normal and in whom no organic disease could be found; 36 previously asymptomatic cases coming to autopsy after sudden death; 15 patients who were ill and had lost more than 28 pounds for reasons other than dermatologic or gastrointestinal disease; 52 who came to autopsy after weight loss of more than 28 pounds during a course of illness. All were subjected to p.o. biopsies of the small intestine with a Watson capsule. Patients with psoriasis and those with wasting diseases showed a greater incidence of grade 3 (ridged shaped villi) and grade 4 (ridged villi with convolutions) architectural changes, than of grade 1 (cylindrical villi) or grade 2 (leaf-shaped villi). In the lactose utilization test, the degree of failure to utilize lactose was related to the extent of skin involvement with psoriasis, in the absence of any impairment of glucose tolerance or excretion of D-xylose.

8527 MESENTERIC HEMODYNAMICS DURING ENDOTOXEMIA IN THE BABOON. (E.) Swan, K. G. (Walter Reed Army Inst. Res., Washington, D. C.), R. W. Barton and D. G. Reynolds. *Gastroenterology* 61(6):872-876, 1971.

The i.v. injection of *Escherichia coli* endotoxin (21 mg/kg) caused a progressive drop in arterial pressure, and at 2 hr the value was significantly below control pressure. Neither blood flow nor portal pressure was affected by the endotoxin during the 4-hr experiment, except for a transient increase in flow immediately after the saline infusion. Calculated mesenteric vascular resistance thus declined progressively after endotoxin injection and at 2 hr the value was significantly below the control. Endotoxin had no effect on blood pH, PCO_2, PO_2 or oxygen saturation when measured at 1 and 3 hr after injection. The concentration of epinephrine increased steadily during the experimental period and at 4 hr the concentration of both epinephrine and norepinephrine was significantly above the control levels. Thus, in the baboon a lethal dose of endotoxin, which induces severe arterial hypotension, fails to impede the flow of blood to the intestine.

8528 BENIGN LYMPHOID POLYPOSIS OF ILEUM: THREE CASES AND A REVIEW OF THE LITERATURE. (E.) Patel, V. K. (U. Saskatchewan Hosp., Saskatoon, Canada) and C. F. Awen. *Can. J. Surg.* 14(6):402-405, 1971.

Three asymptomatic cases of benign lymphoid polyposis of the terminal ileum were found incidentally at autopsy. Small sessile polyps, measuring from 0.1 - 0.3 cm in diameter were found. Although gross pathology showed somewhat similar polyps in all 3 cases, histopathology revealed differences. In case 1, the multiple globular polypoid structures, supported by thick stalks and covered with many microvilli, were made up of hyperplastic lymphoid tissue. The terminal ends of the polypi were clubbed. The polyps of the 2 other cases revealed a lesser amount of lymphoid tissue in the stalk as well as in the polyp tips. Mitotic figures were found frequently in case 1, and infrequently in cases 2 and 3. The lesions in all 3 cases showed eosinophils; reticulum cells with large pink nucleoli were more marked in case 1. Para-aortic and mesenteric lymph nodes did not reveal any neoplastic or hyperplastic process. Lymphoid polyposis seems to be more common in men than in women. Atypical features found in 1 case suggests possible early malignant transformation progressing to multiple lymphomatous polyposis.

8529 DIOSPYROBEZOAR OF THE JEJUNUM IN A POSTGASTRECTOMY PATIENT. (E.) Edelstein, M. M. (Northridge Hosp. Found., Calif.), E. Freed and M. Wexler. *Arch. Surg.* 103(6): 765-766, 1971.

A case of a diospyrobezoar (persimmon bezoar) obstructing the small intestine of a postgastrectomy patient is presented. A 75-yr-old woman had recurrent vomiting and epigastric burning. Two weeks earlier the patient had eaten several persimmons. A small intestine study demonstrated obstruction of the jejunum by a round grumous mass containing multiple small radiolucencies, similar in appearance to feces mixed with air, approximately 30 cm from the stoma of a previous gastroenterostomy. An exploratory laparotomy and jejunotomy were performed, with evacuation of a bezoar. Approximately 75% of gastric phytobezoars are caused by the ingestion of persimmons. Since diospyrobezoars require the presence of acid persistent in the gastric remnant, they probably remain a rare source of postgastrectomy intestinal obstruction.

8530 CALCULUS IN A MECKEL'S DIVERTICULUM - A PREOPERATIVE RADIOLOGICAL DIAGNOSIS. (E.) Dovey, P. (Roy. Marsden Hosp., Sutton, England). *Br. J. Radiol.* 44(527):888-890, 1971.

A 55-yr-old man presented with a 2-month history of abdominal pain, mostly in the right iliac fossa but moving at the end of a day to his back and right buttock. Radiological studies revealed an oval, laminated opacity in the right side of the pelvis, similar in appearance to a gallstone. A cholecystogram was normal and an enterolith, possibly in a Meckel's diverticulum, was therefore considered. A barium meal and follow-through examination showed the calculus to be lying in the diverticulum. The etiology of the calculus in the present case was obscure, but intestinal stasis following appendectomy, possibly with secondary diverticulitis, may have been a factor.

8531 INFLAMMATORY FIBROID POLYP OF THE ILEUM: A CASE REPORT. (E.) Fenton, F. (Roy. Perth Hosp., Australia), L. R. Matz and D. Golinger. *Pathology* 3(4):257-262, 1971.

A 45-yr-old woman had 3 episodes of upper abdominal pain with nausea and vomiting. Abdominal distention and epigastric tenderness appeared and persisted; laparotomy was performed and what was thought to be an ileal intussusception with a tumor at the apex was resected. Features leading originally to a diagnosis of malignancy were invasion and replacement of muscularis propria, the presence of mitoses and the apparent invasion of a blood vessel with destruction of internal elastic lamina. The initial interpretation was Kaposi's sarcoma. Histological appearances were reviewed, and the vascular, spindle cell and stromal features were recognized as characteristic of an inflammatory fibroid polyp. Cells were regularly spaced and separated by parallel bands of collagen and reticulum. Such areas were identical with previously illustrated histologic pictures of inflammatory fibroid polyps, for which a neurogenic nature was purported. The demonstration of neurites by silver impregnation in said areas of such heavy reticulun content is suspect; no tactoid neural formations were seen in any of the lesions.

8532 COMPLICATIONS OF VENTRICULO ATRIAL AND PERITONEAL SHUNTS. REPORT OF A CASE WITH PULMONARY EMBOLISMS AND INTESTINAL

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8598 RADIOGRAPHIC CHANGES OF THE SMALL INTESTINE IN LYMPHOID HYPERPLASIA ASSOCIATED WITH DYSGAMMAGLOBULINEMIA. (E.) Gronner, T. (U. California Sch. Med., San Francisco) and G. R. Smith. *Radiol. Clin. Biol.* 40(3): 184-189, 1971.

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8600 DIAGNOSIS AND TREATMENT OF EARLY POST-OPERATIVE INTESTINAL OBSTRUCTION. (Fr.) Setbon, L. (Lariboisiere Hosp., Paris). *Presse Med.* 79(24):1117-1120, 1971.

See also numbers: 8089, 8341, 8410, 8428, 8447, 8465, 8495, 8496, 8498, 8507, 8718, 8986, 8988

REGIONAL ENTERITIS

8601 PNEUMATURIA AS A PRESENTING SIGN OF REGIONAL ENTERITIS. (E.) Peck, O. C. (Palo Alto Med. Clin., Calif.) and R. R. Babb. *Am. J. Gastroenterol.* 56(5):463-465, 1971.

A case report of a 37-yr-old male patient with repeated urologic investigation for bladder symptoms including pneumaturia is presented. Two yr after his initial urinary tract symptoms he was hospitalized for cramping abdominal pain and was diagnosed as having gastroenteritis. Barium examination revealed an enlarged terminal ileum lying near the bladder. At laparotomy the distal ileum was found to be thickened, inflamed, and adherent to the bladder. A fistulous tract that extended from the ileum into the bladder was removed, and a 2.5-cm section of the bladder excised. The diseased ileum was resected and an end-to-end ileoascending colostomy accomplished. Microscopic studies on the ileum revealed regional ileitis. It is unusual that this patient's bladder complaints preceded those referable to his diseased ileum, and it was only after he mentioned pneumaturia that attention was given to the gastrointestinal tract. Urologic complications may accompany inflammatory bowel diseases and therefore patients with urinary tract symptoms should be studied for possible underlying bowel disease.

8602 ON THE SURGICAL TREATMENT OF CROHN'S DISEASE. (E.) Lubbers, E. J. C. (U. Nijmegan Dept. Surg., Netherlands). *Folia Med. Neerl.* 14(4):139-144, 1971.

Forty patients (65% of the total) with Crohn's disease required surgical treatment during the period 1957 to 1970. These patients were then followed, with the shortest follow-up being 6 months. The operative procedure of choice was resection, except in 2 cases where this was technically impossible due to ileitis, and in 3 patients with ileocolitis where a colostomy was established. The colostomy soon proved to be insufficient in 1 case and resection had to be performed. In 2 other cases, the stoma was closed because of favorable results, but within 2 and 3 yr, resp., a coloproctectomy had to be performed. Poor results were observed after entero-anastomosis and this procedure has been abandoned. There were no deaths after 34 first, and 17 second operations; of 7 patients who required a third operation, 2 died; 1 of 2 patients who underwent a fourth operation died. A malignant seminoma caused the fourth death. Thus the mortality rate for the series was 10%. Results of the study indicate that satisfactory results can be achieved in 70% of the cases, after 1 or several operations. Results are better if conservative treatment is exhausted prior to first, second, or third surgical procedures. Resection should include some normal tissue but excessive resection is to be avoided.

8603 AN EPIDEMIOLOGICAL STUDY OF CROHN'S DISEASE IN NORTHEAST SCOTLAND. (E.) Kyle, J. (Roy. Infirm., Aberdeen, Scotland). *Gastroenterology* 61(6):826-833, 1971.

The incidence and prevalence of Crohn's disease in Northeastern Scotland between 1955 and 1969 was studied. During the 15 yr period, 166 cases of Crohn's disease were observed. Of these, 80% (133) had small intestinal involvement (regional enteritis), and in the remaining 33 the colon and rectum were the sites principally affected. The risk of developing Crohn's disease was greatest in the third decade of life, more than 90% of the cases then being of the small bowel type. Female outnumbered males by almost 2 to 1 (106 to 60). The incidence per 100,000 per annum between 1955 and 1961 in Aberdeen was 1.4 and 1.9 for males and females, resp., and 1.8 for both males and females in Uppsala. During 1962-67 the incidence in Uppsala was 3.4 for males and 2.8 for females, while in Aberdeen, between 1962 and 1968 the incidence for males and females was 1.9 and 3.0, resp. The prevalence was 32.5/100,000 in 1969 in Aberdeen, and 27.0/100,000 in 1967 in Uppsala. Most of the observed increase was attributed to colonic disease in older females. The incidence was higher in city dwellers than people living in rural areas; however, marital status, social class, blood group and familial factors did not affect the incidence.

8604 SURGICAL AND INTERNAL MEDICAL TREATMENT OF REGIONAL ILEITIS. (Ger.) Grewe, H. E. (Osnabruck City Hosp., Germany), K. Lampe and V. Berndt. *Zentralbl. Chir.* 96(42):1448-1459, 1971. (31 references)

A review, supplemented by statistical analysis of 50 cases, concludes that surgery is the treatment of choice for patients with Stage III of Crohn's disease, while medication is the treatment of choice for patients with Stage I or II. In the presence of positive immunologic findings in Stage I or II, or in Stage III patients not requiring immediate surgical intervention, supplementary treatment with azathioprine is recommended (100 mg/day, with or witnout concurrent prednisone and subject to determination of WBC, thrombocyte and hemoglobin levels every third day). Immunologic findings were positive in 11 of 15 patients studied from this point of view. At the time of report, 10 who were treated with azathioprine (as above) had been free of recurrence for periods of 6-18 months, and 5 of 10 had shown negative immunologic findings at the end of the first 6 months of treatment.

8605 CLINICAL FEATURES AND EPIDEMIOLOGICAL DATA ON CROHN'S DISEASE IN THE BASLE AREA. (E.) Fahrländer, H. (U. Basel Med. Surg. Clins., Switzerland) and C. Baerlocher. *Scand. J. Gastroenterol.* 6(7):657-662, 1971.

During the 10-yr period from 1960 through 1969, in Basle, Switzerland there were 110 cases of Crohn's disease of the small and large bowel. For the entire period the yearly incidence was 1.6/100,000, while for the first 7 yr it was 1.1/100,000 and for the last 3 yr, 2.6/100,000. The mean yearly mortality rate was 0.14/100,000. Isolated terminal ileitis was found only in 37 patients (33.6%), and ileocolitis in 25 (22.7%). Ileitis or ileocolitis combined with some other areas of colonic involvement was found in 10 (9%), total or subtotal colitis in 25 (22.7%). Surgery with subsequent histological confirmation of the lesion was done in 61 cases, while another 8 were verified by biopsy, and in 41 diagnosis was made by X-ray alone. Among 93 patients the time between the onset of symptoms and diagnosis was 1 yr or less in 60, 2 yr in 5, 3-5 yr in 14, 5-10 yr in 11 and longer in 3.

8606 REGIONAL ENTERITIS. (Sp.) Guix Santasusagna, M. (St. Cruz San Pablo Hosp., Barcelona, Spain). *Barcelona Quir.* 15(2):157-163, 1971.

8607 HISTOPATHOLOGY OF CROHN'S DISEASE. (E.) Morson, B. C. (St. Mark's Hosp., London). *Scand. J. Gastroenterol.* 6(7):573-575, 1971.

8608 NONSCLEROSING TERMINAL ILEITIS IN CHILDREN. (Pol.) Winnicki, S. (Med. Acad. Dept. Pediatr. Radiol., Warsaw, Poland), T. Zalewski and D. Jakubowska. *Pol. Przegl. Radiol. Med. Nukl.* 35(4):425-430, 1971.

8609 REGIONAL ENTERITIS (CROHN'S DISEASE). (E.) Engel, A. and T. Larsson (Eds.). Stockholm, Nordiska Bokhandelns Forlag, 1971, 324 pp.

8610 INTESTINAL OBSTRUCTION AS A SEQUEL OF CROHN'S REGIONAL ENTERITIS. (Rum.) Iliescu, G. (Alex Sahia Hosp., Bucharest, Rumania), G. Popa and D. Minculescu. *Chirurgia (Bucur.)* 20(7):637-641, 1971.

8611 ILEOCOLIC CROHN'S DISEASE. (Fr.) Roux, M. (Vaugirard Hosp., Paris), P. Hillemand and A. De Lavedan De Casaubon. *Sem. Hop. Paris* 47(23):1512-1514, 1971.

8612 CROHN'S DISEASE: AN UNUSUAL CAUSE OF ACUTE INTESTINAL OCCLUSION. (Sp.) Orgaz, J. (Med. Ctr., Cordoba, Argentina), A. Juaneda and O. Mangini. *Prensa Med. Argent.* 58(5):272-274, 1971.

8613 MEDIUM CHAIN TRIGLYCERIDES IN THE THERAPY OF SMALL BOWEL CROHN'S DISEASE. (E.) Tasman Jones, C. (Auckland Hosp., New Zealand). *NZ Med. J.* 73(467):214-215, 1971.

See also numbers: 8643, 8656, 8743

MALABSORPTION

8614 LACTOSE AND LACTASE - A HISTORICAL PERSPECTIVE. (E.) Kretchmer, N. (Stanford U. Sch. Med., Calif.). *Gastroenterology* 61(6):805-813, 1971.

The role of lactase in the metabolism of lactose in various species and in man is reviewed (48 references). A major emphasis is placed on reports from various countries of intolerance to lactose of infants and children, with special reference to recent studies of this disorder of metabolism in various African nations and in the American Black. Variations in lactose metabolism at different stages in the development of the individual are compared in man and several animal species.

8615 TRANSIENT LACTOSE INTOLERANCE IN PREMATURE INFANTS. (E.) Abdo-Bassols, F., F. Lifshitz (U. Maryland Hosp., Baltimore), E. Diaz del Castillo and V. Martinez-Garza. *Pediatrics* 48(5):816-821, 1971.

Two premature infants who presented transient lactose intolerance since birth are reported. The parents of both patients and 2 siblings of 1 were also intolerant to this disaccharide. Both infants were males born after 34 weeks gestation. The 2 infants had flat sugar curves and an intolerance to lactose during the first 2 months of life, as manifested by liquid stools with acid pH and excretion of large amounts of reducing substances and glucose in the feces while being fed milk formula or when given a standard oral load of lactose (1.75 g/kg body weight). Lactose intolerance in these patients, their siblings, and their parents may or may not have been due to a familial, hereditary lactose deficiency.

8616 DIFFERENTIAL DIAGNOSTIC APPROACH TO CLINICAL PROBLEMS OF MALABSORPTION. (E.) Wilson, F. A. and J. M. Dietschy (U. Texas Southwestern Med. Sch., Dallas). *Gastroenterology* 61(6):911-931, 1971.

The major spontaneous and iatrogenic malabsorption syndromes are classified, and the usefulness and possible artifacts of the commonly utilized tests of intestinal function are outlined. The laboratory findings in some 1000 cases of malabsorption obtained from the literature are reviewed. The normal mechanisms of fat absorption are compared with protein and carbohydrate absorption. Tests used to differentiate the types of malabsorption include quantitative stool fat determination, fecal nitrogen, xylose absorption, B_{12} absorption and peroral small intestinal biopsy. The correlation between pathophysiology and absorptive tests in disorders of fat absorption is divided into 6 areas: insufficient intraluminal pancreatic enzyme activity, intramural small intestine disease, malabsorption due to multiple defects, malabsorption of uncertain etiology, and steatorrhea secondary to drug administration. The pathophysiology of individual diseases and disorders causing malabsorption are discussed within this framework. Grouping the malabsorption syndromes according to the site of the defect has considerable usefulness since diseases that alter absorption at the same locus tend to have similar diagnostic findings in terms of the degree of steatorrhea, the presence or absence of azotorrhea, the results of xylose and B_{12} absorption tests, and the potential usefulness of the intestinal biopsy.

8617 INTESTINAL MALABSORPTION AND THE SKIN. (E.) Marks, J. (Roy. Victoria Infirm., Newcastle upon Tyne, England) and S. Shuster. *Gut* 12(11):938-947, 1971.

There are 4 ways in which diseases of the skin and intestine can be interrelated: malabsorption can cause a rash; a rash can cause malabsorption; both can have a common cause or they can be related indirectly. Rashes, usually eczematous or psoriasiform, occur secondary to tropical sprue or postgastrectomy steatorrhea and gluten-induced enteropathy, but no information is recorded in the case of pancreatic steatorrhea. The mechanism of rashes produced by malabsorption have not been worked out. Dermatogenic enteropathy (steatorrhea resulting from a rash) is most common and severe in patients with extensive rashes, and disappears and commonly recurs following the course of the skin disorder. Intestinal malabsorption of fat, d-xylose, iron, folate, calcium and lactose has occurred in patients with dermatogenic enteropathy, but whether mild structural changes in the small intestinal mucosa occur is unknown. Diseases common to the skin and intestine are the collagen diseases, acrodermatitis enteropathica and allergic gastroenteropathy. An example of the indirect relationship between disease and malabsorption is that between dermatitis herpetiformis and celiac disease. The celiac disease of dermatitis herpetiformis often shows no symptoms or detectable biochemical abnormalities and hence should have repeated jejunal biopsies at regular intervals.

8618 INTESTINAL LACTASE DEFICIENCY AN AN APPARENTLY NORMAL PERUVIAN POPULATION. (E.) Figueroa, R. B. (U. San Marcos Med. Sch., Lima, Peru), E. Melgar, N. Jó and O. L. Garciá. *Am. J. Dig. Dis.* 16(10):881-889, 1971.

According to results of a lactose tolerance test and intestinal lactase assays, 10 of 30 apparently healthy Peruvians were considered normal and were taken as controls. The other 20 were considered abnormal, and referred to as asymptomatic, since they could tolerate small amounts of milk daily without noticeable gastrointestinal stress. Another group of 20 milk-intolerant persons were included in the study. Both asymptomatic and milk-intolerant patients experienced meteorism, abdominal pain and/or diarrhea, and had a stool pH between 5.2 and 6.5 after increasing the lactose load. Both groups were also lactase-deficient on enzymatic assay of intestinal biopsy and showed low blood glucose curves after the lactose tolerance test. Sucrase activity was similar in control and the other 2 groups, indicating that lactase deficiency was selective and not part of a generalized intestinal enzyme deficiency. This high incidence of lactase deficiency in asymptomatic individuals appears to be acquired.

8619 MALABSORPTION IN C57 MICE EXPERIMENTALLY INFECTED WITH JOHNE'S DISEASE. (E.) Madge, D. G. (Wye Coll. Dept. Biol. Sci., Kent, England). *Comp. Biochem. Physiol.* 40(3A):649-658, 1971.

C57 mice infected with Mycobacterium johnei (Johne's disease) were characterized by general apathy, dullness of coat and loss of appetite and body weight. The small intestine in situ was distorted, pale and edematous and, microscopically, showed mild submucosal inflammation with clumps of bacilli frequently located in the lamina propria. Some villi were blunted or leaf-shaped, while a few were thicker and shorter; crypts were occasionally slightly longer than normal. Villus epithelium revealed degenerative changes, with bacilli accumulating in the lamina propria adjacent to the eroded patches. Absorption of D-glucose, L-histidine and L-arginine was impaired and net water uptake was lowered in infected mice. Body weight and protein content declined while small intestinal weight and water content was increased. Endogenous nonspecific hexose, histidine, and arginine content was unchanged. Clinical symptoms and some biochemical abnormalities shown by Johne's disease in cattle are similar to diarrheal disease complexes in other mammals produced by bacterial, protozoan or helminth intestinal infections, and also by patients with tropical and nontropical sprue and children with celiac disease.

8620 INCIDENCE OF SMALL-INTESTINAL MUCOSAL ABNORMALITIES AND OF CLINICAL COELIAC DISEASE IN THE RELATIVES OF CHILDREN WITH COELIAC DISEASE. (E.) Robinson, D. C. (Univ. Dept. Child Health, Newcastle upon Tyne, England), A. J. Watson, E. H. Wyatt, J. M. Marks and D. F. Roberts. *Gut* 12(10):789-793, 1971.

A higher than normal incidence of clinical celiac disease and of small intestinal mucosal abnormalities was noted in this study of the families of 22 children with celiac disease. Clinical histories were obtained from 34 parents, 34 sibs, 164 second degree, and 238 third degree relatives. Two first degree relatives (1 parent, 1 sibling) gave a history indicative of celiac disease. Biopsy specimens from 29 parents revealed 3 parents with partly flat and partly convoluted specimens. The diagnosis of celiac disease was made in 1 case. These data indicate that the mode of inheritance for celiac disease is through a dominant gene of reduced penetrance indicating a multifactorial pathogenesis. A polygenetic basis of inheritance with interaction of the environment is postulated. It is estimated that the genetic component contributes 45% ± 9% to the development of the disease. Liability to clinical celiac disease appears to be of moderate heritability.

8621 EFFECT OF MATERNAL PROTEIN DEPRIVATION ON NEONATAL INTESTINAL ABSORPTION IN RATS. (E.) Loh, K.-R. W. (U. California Dept. Nutr., Davis), R. E. Shrader and F. J. Zeman. *J. Nutr.* 101(12):1663-1671, 1971.

Jejunal villi of newborn pups born of female rats fed a protein-deficient diet throughout gestation, were smaller in diameter, shorter in length and more widely separated than those from control rats. Enterocytes were low columnar cells with vesicular cytoplasm, crypt cells were difficult to distinguish and microvilli were present only on the luminal surface of the apical cells. Reduction of peroxidase uptake by enterocytes involved not only uptake per cell, but a limitation in the number of cells in which absorption occurred. In the intestine of the young of protein-deficient females, absorption indices indicated that enterocytes of comparable villi (controls, experimental males) absorbed significantly less peroxidase. Absorption of emulsified fat by control and experimental animal jejunal enterocytes was similar to peroxidase absorption. The apical cells of jejunal villi of the experimental rats contained fewer and smaller lipid vacuoles; cells of the lateral and proximal portions of villi containing only a few small scattered lipid droplets. Cells in which the absorptive defect was most evident lacked well defined brush borders and showed decreased content of cytoplasmic organelles.

8622 LACTASE DEFICIENCY IN NIGERIANS. (E.) Olatunbosun, D. A. (U. Ibadan Metabol. Res. Unit., Nigeria) and B. K. Adadevoh. *Am. J. Dig. Dis.* 16(10):909-914, 1971.

The prevalence of lactase deficiency among some of the ethnic groups of Nigerians in Ibadan was studied using lactose and glucose-galactose tolerance tests. The overall prevalence of lactase deficiency was 81% (67 of 83 subjects), with 84% of Yorubas (40 of 48), 60% of Hausa/Fulani (9 of 15), and 82% of Ibos (9 of 11) showing a maximum rise in sugar level below 20 mg/100 ml after lactose ingestion. Glucose-galactose intolerance was present in only 3 Yorubas out of 83 subjects. No correlation was observed between age, sex, present milk intake and intolerance to lactose. Thus, intestinal lactase deficiency seems to be widely prevalent among Nigerians living in Ibadan. This deficiency may be due to lack of induction from low milk intake after weaning, rather than an inherited defect.

8623 SMALL-BOWEL VOLVULUS, MALABSORPTION AND MUCOSAL DIAPHRAGM OF THE PYLORUS. A CASE REPORT. (E.) Devroede, G. (Univ Hosp. Ctr., Sherbrooke, Quebec, Canada) and R. Beaudry. *Am. J. Dig. Dis.* 16(10):953-958, 1971.

A patient who developed diarrhea and features of malabsorption shortly after surgical treatment of small intestinal volvulus is presented. After surgery for volvulus the patient developed severe steatorrhea, nocturnal diuresis and rapid turnover of radioiodinated albumin in addition to severe diarrhea. It was felt that marked obstruction of the venous circulation probably induced the intestinal lesions responsible for the postoperative abnormalities. Following a resection of a mucosal diaphragm of the pylorus, the patient became completely asymptomatic. A gastrointestinal series revealed a normal ileum in the postoperative period, indicating that the lesions were limited to the loop which had undergone volvulus.

8624 EVALUATION OF D-XYLOSE ABSORPTION IN TROPICAL SPRUE IN NORTH INDIA. (E.) Mehta, S. K. (Postgrad. Inst. Med. Educ. Res., Chandigarh, India), K. K. Khurana, N. R. Mysorekar and P. N. Chhuttani. *Indian J. Med. Res.* 59(4): 552-559, 1971.

8625 CHRONIC HYPOMAGNESEMIA WITH MAGNESIUM DEPENDENT HYPOCALCEMIA. I. A NEW SYNDROME WITH INTESTINAL MAGNESIUM MALABSORPTION. (E.) Nordio, S. (U. Genoa G. Gaslini Dept. Pediatr., Italy), A. Donath, F. Macagno and R. Gatti. *Acta Paediatr. Scand.* 60(4):441-448, 1971.

8626 CLINICAL REVIEW. DIARRHOEA IN INFANTS. (E.) Hamilton, J. R. (Hosp. Sick Child., Toronto, Ontario, Canada). *Mod. Med. (London)* 16(6):410-421, 1971.

8627 'MALABSORPTION SYNDROME' IN DIVERTICULOSIS OF THE ENTIRE SMALL INTESTINE, AND INTESTINAL OBSTRUCTION. (Ger.) Kaniastas, D. (City Hosp., Rosenheim, Germany). *Med. Welt* 22(26):1084-1086, 1971.

8628 HYPEROXALURIA AND RENAL CALCULI IN ILEAL DISEASE. (E.) Dowling, R. H. (Roy. Postgrad. Med. Sch., London), G. A. Rose and D. J. Sutor. *Lancet* 1(7709):1103-1106, 1971.

8629 THE FAECAL EXCRETION OF LOW MOLECULAR WEIGHT FATTY ACIDS IN PREMATURE BABIES. (E.) Anyon, C. P. (Hutt Hosp., Lower Hutt, New Zealand) and K. G. Clarkson. *Aust. Paediatr. J.* 7(1):34-36, 1971.

8630 STEATORRHOEA IN THE PUNJAB: THE RESULTS OF A VILLAGE SURVEY. (E.) Cowan, B. (CMC Hosp., Ludhiana, Punjab, India), V. K. Satija and B. P. Malvea. *J. Trop. Med. Hyg.* 74(6):137-140, 1971.

8631 HEREDITARY INTOLERANCE TO FRUCTOSE. (Fr.) Rieu, D., J. M. Rey, H. Bonnet and R. Jean. *J. Med. Montpellier* 6(3):145-155, 1971.

8632 EARLY DIAGNOSIS OF DISTURBED INTESTINAL CALCIUM ABSORPTION IN RENAL FAILURE. (Ger.) Hesch, R. D. (U. Gottingen Med. Clin., Germany), H. V. Henning, W. Gerlach and F. Scheler. *Klin. Wochenschr.* 49(2):115-116, 1971.

8633 SMALL INTESTINE SUCTION BIOPSY IN CHILDHOOD: TECHNIQUE, COMPLICATIONS, AND SIGNIFICANCE IN THE DIAGNOSIS OF INTESTINAL DISORDERS. (Ger.) Emons, D. (Univ. Pediatr. Clin., Bonn, Germany) and H. W. Rotthauwe. *Klin. Wochenschr.* 49(12):695-705, 1971.

8634 SYMPOSIUM ON DISEASE OF THE SMALL INTESTINE IN CHILDREN. (E.) Anonymous. *Med. J. Aust.* 1(15):816-824, 1971.

8635 SERUM CONCENTRATIONS OF IMMUNOGLOBULINS WITH SPECIAL CONSIDERATION OF IgE IN CELIAC DISEASE. (Ger.) Mietens, C. (Univ. Pediatr. Clin., Wurzburg, Germany), S. G. O. Johansson and H. Bennich. *Klin. Wochenschr.* 49(5):256-260, 1971.

8636 ACUTE MYELOID LEUKEMIA IN A GIRL WITH CELIAC DISEASE. (E.) Gupte, S. P. (Postgrad. Inst. Med. Ed. Res., Chandigarh, India), A. Perkash, C. M. Mahajan, P. K. Aggarwal and P. R. Gupta. *Am. J. Dig. Dis.* 16(10):939-941, 1971.

8637 EDEMAS IN MALABSORPTION SYNDROME. (Cz.) Fric, P. (Charles U. Sch. Gen. Med., Prague). *Cesk. Gastroenterol. Vyz.* 25(3):126-130, 1971.

8638 THE SYNDROME OF SUGAR MALABSORPTION. (Sp.) Pena Angulo, J. F. (Sch. Med., Granada, Spain). *Rev. Clin. Esp.* 121(2):123-136, 1971.

8639 PATHOPHYSIOLOGY AND PATHOLOGIC BIOCHEMISTRY OF STEATORRHEA. (Ger.) Muller, G. (Martin Luther U. 2nd Med. Clin., Halle, Germany) and K. Seige. *Dtsch. Gesundheitsw.* 26(14):621-626, 1971.

8640 ELECTRON MICROSCOPY IN THE DIAGNOSIS OF WHIPPLE'S DISEASE. (Fr.) Pages, A. (Gui de Chauliac Med. Surg. Ctr., Montpellier, France), P. Baldet and C. Marty. *Presse Med.* 79(25):1172, 1971.

8641 MODERN ASPECTS IN THE DIAGNOSIS OF CELIAC DISEASE. (Ger.) Gruttner, R. (Univ. Pediatr. Clin., Hamburg, Germany) and T. Lucking. *Monatsschr. Kinderheilkd.* 119(1):41-47, 1971.

8642 LACTASE DEFICIENCY IN ULCERATIVE PROTOCOLITIS AND CROHN'S DISEASE. (Fr.) Penas, A. S. and S. C. Truelove. *Med. Hyg. (Geneve)* 29(948):126, 1971.

See also number: 8674

8643 COLITIC ARTHRITIS. CLINICAL AND RADIOGRAPHIC MANIFESTATIONS. (E.) Clark, R. L. (USPHS Hosp., Norfolk, Va.), C. A. Muhletaler and S. I. Margulies. *Radiology* 101(3): 585-594, 1971.

Subjects consisted of 22 patients seen from 1952-1970 with the diagnosis of ulcerative colitis (18) or regional enteritis (4), all of whom demonstrated clinically or radiologically significant associated arthritis. This group represented less than 10% of the population of new patients with either of these diseases seen during this period. Ages ranged from 20-60 yr (mean and median of 39 yr), with 12 females and 10 males, and with 65% being white. Of the 18 with clinical arthritis (4 had X-ray changes only), the colitis preceded the arthritis by several yr in 9 and by several months in 5, while simultaneous onset was described in 3. The arthritis preceded the colitis in only a single patient with Still's disease. Full clinical information was available in 17 of the 18, and 8 of these clearly demonstrated a relationship between exacerbations of colitis and arthritis. Colectomy in only 1 of these 8 patients was followed by disappearance of arthritis. In 9 (53%) the bouts of arthritis were unrelated to specific episodes of colitis. The most commonly involved joints were the knees and ankles, with less frequent involvement of hands, wrists, hips and elbows. Of the 18, 14 had overt migratory arthritis, symmetrical in nature. Routine laboratory studies did not contribute to the diagnosis of colitic arthritis. On X ray, axial changes consisted of sacro-illiitis in 15 of the 18 (83%) and ankylosis of the spine in 2 (11%), while peripheral changes (erosions, joint narrowing) were seen in 5 (28%) and both peripheral and axial changes in 2 (11%), of whom 1 had Still's disease.

8644 TRACTION DIVERTICULA OF THE COLON. (E.) Nolan, D. W. (United Bristol Hosps., England), W. J. Norman and G. R. Airth. *Clin. Radiol.* 22(4):458-461, 1971.

Traction diverricula of the colon associated with calcified mesenteric lymph nodes were encountered in 4 cases over a period of 15 months. In each case the diverticulum was demonstrated on barium enema examination; mucosal folds could be seen passing into the necks of the diverticula, suggesting that they were true diverticula rather than the common false type. In 1 case the diverticulum contracted at the same time as the adjacent colonic wall, and in 3 cases diverticula were lobulated. The outpouching was maximal in each case when the colon was empty, and relatively less marked when the bowel was filled with barium. The formation of these diverticula was probably due to adhesions arising from inflammatory processes in the adjacent lymph nodes. As a result there is scarring and contraction of the inflamed tissue and the wall of the bowel is drawn out in a tent-like fashion.

8645 AN INCREASE IN THE FREQUENCY OF RUPTURED APPENDIX. (Ger.) Kurz, W. (Dist. Hosp., Lubben, Germany) and W. Just. *Zentralbl. Chir.* 96(39):1365-1368, 1971.

A retrospective analysis of 2360 appendectomies performed in the course of 20 yr indicated an 8% incidence of ruptured appendix between 1950-59, inclusive; an 8.14% incidence between 1960-69, inclusive, thus contradicting published reports of an increased frequency of this complication. Among children aged 14 yr or less, the overall frequency was 10.3%; among patients aged 15-49 yr, it was 5.1%; among patients over 50 yr of age, it was 21.2%. A significant decrease of the mortality rate was demonstrable for all groups of patients, during the second 10-yr period.

8646 BLEEDING FROM DIVERTICULA OF THE COLON. (E.) Heald, R. J. (Ochsner Clin., New Orleans, La.) and J. E. Ray. *Dis. Colon Rectum* 14(6):420-427, 1971.

The bleeding that is common in diverticular disease is not, as is commonly believed, a part of the syndrome of diverticulitis. In this study, 40 admissions (36 patients) for bleeding diverticular disease are compared with 40 admissions (37 patients) with diverticulitis. Strict criteria were used for the diagnosis of diverticular disease since this is often a diagnosis of exclusion. In almost all cases final diagnosis was confirmed in surgery. A high incidence of hypertension (2 of 3 patients), and an average age 10 yr older was noted for the diverticular disease patients. The bleeding was usually painless, and lack of concomitant pyrexia and leukocytosis argue against an inflammatory basis for the bleeding. It is believed that a tiny ulcer in the neck of a divertulum erodes a small blood vessel and results in massive painless bleeding. When conservative treatment fails or if blood loss is great total colectomy and ileoproctostomy is the method of choice. Localization of the lesion is not necessary.

8647 A SECOND STUDY OF ANAL PAPILLAE. (E.) Schutte, A. G. (St. Joseph's Hosp., Milwaukee, Wis.) and M. G. Tolentino. *Dis. Colon Rectum* 14(6):435-450, 1971.

The literature is reviewed (19 references). Findings in the present study are compared with those in one made by the authors in 1961. In this study of 1500 proctologic patients (763 males, 737 females), 674 (45%) had 1 or more anal papillae (291 males, 383 females). Of the

1500, 242 had fissures and 169 of these (70%) had fissures in the anorectum which also contained papillae. Of the 674 patients with papillae, 169 (25%) had chronic anal fissures; of these, 105 were females, 64 males. Of the 73 who had fissures but no papillae there were 38 males and 35 females. Among 300 newborns (161 males, 139 females) significant anatomic findings in the anal columns (cephalic dentations of the pecten) were found in only 50 (17%). In 12 of these (3 males and 9 females), the departures from normal were lacking in papillary appearance and were classified as prominent anal columns (developmental variations of the normal). In 38, the findings were tentatively diagnosed as possible vestiges of the anal plate, characterized by blunt, nipple-like or pyramidal prominences of the anal columns. Of these 50 infants, 33 (66%) were available for reexamination at 2 yr of age. None of those reported as having prominent anal columns at birth were found to have developed a papillary ectodermal structure. In only 7 (5 males, 2 females) of the 33 (21%) did deviations from the normal anatomy of the anal columns persist and result in definite papillary structures. Most of the anatomic variations tentatively diagnosed at birth as "possible vestigial remnants of the anal plate" had been obliterated after 2 yr. The findings of this study confirmed those of the first study with respect to incidence, number, location, and variations in shape, size, and growth of anal papillae.

8648 THE ACCEPTABILITY OF ILEOSTOMIES. (E.) Beahrs, O. H. (Mayo Clin., Rochester, Minn.). *Dis. Colon Rectum* 14(6):460-463, 1971.

A review of 497 cases seen between 1951-1965. In the initial years, staged procedures were most common, while later most patients underwent proctocolectomy and ileostomy in a single procedure. Of the 497, 458 involved colectomies for inflammatory disease (idiopathic chronic mucosal ulcerative colitis and Crohn's granulomatous colitis or transmural ulcerative colitis), while 39 underwent colectomies for noninflammatory diseases. Of the 340 with chronic ulcerative colitis, 68 had carcinoma; of the 118 with granulomatous colitis, 29 had involvement of both small and large intestines. The hospital mortality rate was 5.6% (5.9% with chronic ulcerative colitis and 6.8% with granulomatous colitis). There were no deaths after operation for noninflammatory disease. Of those with cancer, 15% died during the first yr, and 45% died after the first yr. In the absence of cancer, 9.1% died during follow-up. Mortality during follow-up in those with granulomatous colitis was 18.2% (7.3% in the first yr and 11.8% later). Of those with cancer but no inflammatory disease, follow-up mortality was 64%. Of 455 with an initial ileostomy, 103 (22.6%) required subsequent surgical revision (26.5% with granulomatous and 9.7% with ulcerative colitis). Healing delayed beyond 3 months was seen in 19% of patients with abdominoperineal resection. A subjective questionnaire was answered by 344 (250 with ulcerative and 82 with granulomatous colitis and 12 with non-inflammatory disease) after a mean follow-up of 7.6 yr. Good health was claimed by 305 (89%), fair by 38 (10%) and poor by 3 (1%). Normal dietary habits without restrictions were claimed by 66, while 15 restricted their diet because of obesity and in the rest restrictions were minimal. Of the 344, 312 had gained weight (with 50% being significantly above their normal weight) and 19 had lost weight. In 85%, management of the ileostomy was not considered a major problem and 96% had returned to their former jobs.

8649 A MODIFICATION OF THE THIERSCH TECHNIC. (E.) Gallegos, L. (Natl. Med. Ctr. Gen. Hosp., Mexico City, Mexico), E. Corral and J. Freire. *Dis. Colon Rectum* 14(6):451-453, 1971.

In a modification of the Thiersch technique experimentally tested in dogs, an electric current was applied to the cerclage, a number 2 surgaloid alloy steel wire, by means of a low-voltage thermocautery (6, 8, 10, 12, 14 or 16 volts). Instead of the ends of the cerclage being joined, they were connected to the thermocautery and an electric current was applied for 30, 60 or 100 seconds, producing a burn in the surrounding area. The effects were evaluated by digital palpation 30 days after treatment. In the total group of 30 dogs, a reduction of the lumen of the anorectal duct by means of fibrosis was achieved at the end of 30 days in 22. With the shorter duration of the cerclage and the cauterization, there was greater reduction of the local inflammatory reactions that characteristically appear with the unmodified procedure.

8650 THE SURGICAL SIGNIFICANCE OF COMPLETE RETROGRADE OBSTRUCTION OF THE COLON. (E.) Faulconer, H. T. (Ferguson Clin., Grand Rapids, Mich.), J. A. Ferguson and B. R. VanZwalenburg. *Dis. Colon Rectum* 14(6):428-430, 1971.

Criteria that should be used in evaluating surgical intervention when barium enema indicates complete or total retrograde obstruction should also include clinical findings and plain roentgenograms. The premise that retrograde obstruction means antegrade obstruction is often not true. Of 44 patients in whom complete total retrograde obstruction was seen on barium enema studies, 50% had no clinical evidence of antegrade colonic obstruction. Diagnosis, which was found to be accurate (79% of all cases), indicated that carcinoma accounted for 64% of the cases and diverticulitis accounted for 23%. No pathological change could be found in 2 patients and the mechanism of the retrograde obstruction cannot be explained. The sigmoid portion of the colon was involved in 66% of the obstructions (29 patients).

8651 SURVIVAL OF PATIENTS AT PENNSYLVANIA HOSPITAL WITH HEPATIC METASTASES FROM CARCINOMA OF THE COLON AND RECTUM. (E.) Abrams, M. S. (Pennsylvania Hosp., Philadelphia) and H. J. Lerner. *Dis. Colon Rectum* 14(6):431-434, 1971.

A retrospective 20-yr study of all patients at Pennsylvania Hospital initially diagnosed as having carcinoma of the colon with hepatic metastases revealed that 58 of the patients had survived surgery and received no chemotherapy. The follow-up records amd charts of these closely-followed 58 patients were used to determine mean survival time and its relation to sex, race, portion of colon involved, and initial treatment. Median survival was 178 days. Less than 10% of the group lived longer than 2 yr; 76% had died within 1 yr; 57 of 58 patients died within 3½ yr. The 23 men in the group had a mean survival of 207 days; the 35 women had a survival of 167 days. The 19 negroes in the study had a median survival of 128 days; the Caucasians survived 188 days. According to the portion of the colon involved in the primary carcinoma, the median survival time was: ascending colon, 110 days; transverse colon, 276 days, descending colon, 207 days; sigmoid, 260 days; rectum, 172 days. Patients who had only laparotomy survived 65 days, probably reflecting far-advanced disease or advanced debilitation.

8652 SURVIVAL CONSIDERATIONS IN COLON CANCER. (E.) Krain, L. S. (11734 Wilshire Blvd., Los Angeles, Calif.). *Am. J. Proctol.* 22(6):380-389, 1971.

Staging, socioeconomic class and patient survival in colon cancer is presented, based on a comparison of data from the California Tumor Registry and data of the National Cancer Institute. The percentage of regional cases has increased in California by 25-30% since 1964 and the proportion of cases due to unspecified sites has decreased from 23.4 to 0.9% during this same period. A significant increase in the percentage of male and female cancer cases diagnosed under age 45 was observed for the period 1930-1970 and is attributed to the increased percentage of colon cancer in non-whites of both sexes under age 45 which may reflect an increased socioeconomic status of Negroes. Poorer survival rates for Negroes and Chinese, and increased rates of disease may account for the increased mortality through time for these rates. Possible reasons for their poor survival may be due to their use of county hospitals where surgery is used less than at private hospitals, and the advanced staging of lesions is these races. A greater percentage of cases tended to be localized in the white than in the non-white races, and more distant cases were noted in the non-whites, which accounted for their poorer survival. The increased non-white mortality is believed to reflect the rising socioeconomic status of these races and their tendency to eat more fats, fruits and meat. For colon cancer distribution, staging and socioeconomic class were directly related. No significantly different localization was found by race or socioeconomic status by site (i.e. cecum, appendix, ascending, transverse, descending or sigmoid colons). No difference in tendency for male or female preference in undergoing surgery was noted. The percent of cases in the distant stage with no definitive treatment within 4 months of diagnosis was increased since 1940, while other modes of treatment such as radiation, surgery plus chemotherapy and hormonotherapy, or surgery plus radiation have been used increasingly for distant uses of colon cancer.

8653 LYMPHATIC CYSTS OF THE COLON. (E.) Girdwood, T. G. (Cumberland Infirm., Carlisle, England) and L. D. Philp. *Gut* 12(11): 933-935, 1971.

A 65-yr-old man reported a 3-month history of left-sided abdominal colic and melena. Rectal and sigmoidoscopic examination were negative, but double contrast barium enema study demonstrated a large, smoothy outlined and well circumscribed polypoidal lesion with a broad base in the medial wall of the descending colon. At laparotomy the polypoidal mass was palpated causing accidental rupture. A segmental resection was undertaken and revealed a large redundant fold of mucosa representing the remains of the ruptured cyst. Histology revealed a large unilocular submucosal cyst lined with flattened epithelium and the appearances were similar to those of a lymphatic cyst without malignant change. Although these cysts are rare (6 cases documented) and cannot be diagnosed radiologically, they must be included in the differential diagnosis of polypoid colonic lesions.

8654 EXTENSIVE STENOSIS OF THE COLON AND FISTULA FORMATION FOLLOWING AMOEBIC DYSENTERY. (E.) Cain, G. D., F. J. Wolma, Jr. and M. Patterson (U. Texas Med. Branch, Galveston). *Gastroenterology* 61(6):898-900, 1971.

The patient (27-yr-old woman) was treated for Entamoeba histolytic infestation with emetine hydrochloride s.c. for 5 days. Chloroquine and diiodohydroxyquin were given p.o. Seven months after the initial symptoms appeared and 2 months after discharge from the hospital, she returned with right lower quadrant pain. Barium enema showed extensive areas of stenosis of the entire transverse colon and parts of the descending colon, as well as an enterocolic fistula at the midtransverse colon. Laparotomy was performed at which time the adhesions were lysed, the enterocolic fistula was repaired, and the colon was resected from the terminal ileum to the mid-sigmoid region. A permanent ileostomy was constructed and her postoperative case was uneventful.

8655 INFLAMMATORY COLITIS IN A VETERANS HOSPITAL. I. ULCERATIVE COLITIS. (E.) Sanders, M. G. (Toronto Western Hosp., Ontario, Canada) and E. M. Schimmel. *Am. J. Gastroenterol.* 56(6):526-534, 1971.

Sixty-four patients with ulcerative colitis seen at Boston Veterans Administration Hospital were reviewed. Patients were all white, with a high percentage of Jewish patients. Half of the patients had the onset of symptoms in the third decade. The total number of hospital admissions for the group was 365, the average patient having 1 hospital admission every 2 yr for treatment of his colitis. The most common reason for the 21 colectomies performed was failure of medical therapy to control bloody diarrhea. Suspected carcinoma (5 cases), toxic megacolon (3 cases), pyoderma gangrenosum (1 case) and colonic perforation (1 case) accounted for the other colectomies. The total incidence of carcinoma was 6.3%, and in those patients who developed cancer, the average duration of colitis before cancer developed was 22 yr, compared to 11 yr duration of colitis in the noncancer group. Thirty-three patients had universal colitis; 19 of 21 colectomies, all 4 carcinomas and 7 deaths occurred in this group.

8656 INFLAMMATORY COLITIS IN A VETERANS HOSPITAL. II. GRANULOMATOUS ILEOCOLITIS. (E.) Sanders, M. G. (Toronto Western Hosp., Ontario, Canada) and E. M. Schimmel. *Am. J. Gastroenterol.* 56(6):535-541, 1971.

A follow-up averaging 13 yr on 24 patients having granulomatous ileocolitis is reported. All patients were white with a high percentage of Jewish patients. The mean age of onset was 26 yr and the total number of hospital admissions was 204; patients had more than 1 admission for treatment of bowel disease every 2 yr. Forty-nine abdominal procedures were performed on 67% of the patients. Resection alone was done in 10, bypass alone in 3 and one-third of all operations involved combined procedures such as incision and drainage of an intraabdominal abscess plus resection. Most patients came to surgery within the first 5 yr of disease. Two-thirds of the group had perirectal disease, consisting usually of a perirectal abscess or fistula, during the course of their disease. Six patients (25%) who underwent definitive abdominal procedures later developed perirectal disease which required surgical therapy in all cases. Only 6 patients remained asymptomatic following surgery.

8657 ISCHAEMIC ENTEROCOLITIS: AN EXPRESSION OF THE INTRAVASCULAR COAGULATION SYNDROME. (E.) Whitehead, R. (Radcliffe Infirm., Oxford, England). *Gut* 12(11):912-917, 1971.

A review is made of 20 cases of ischemic enterocolitis coming to autopsy from 1948 to 1968 (with original diagnosis of either ischemic colitis, uremic enterocolitis, pseudomembranous enterocolitis, postoperative enterocolitis or staphylococcal enterocolitis). All had an absence of major vascular pathology and autopsy examination included sections from at least 6 other tissues or organs. The outside of the intestine frequently appeared normal, sometimes reddened or darkened. Internally the affected mucosa was reddened or hemorrhagic, with hyperemia and ulceration which sometimes appeared superficial and pinpoint, or deeper and transverse, longitudinal or serpiginous. The ulcers had necrotic ragged margins. Microscopically, the earliest lesion appeared to be thrombosis of the capillary plexuses high up in the mucosa. This was followed by necrosis of the superficial layers of the mucosa with edema and hemorrhages and an acute inflammatory infiltrate in the lamina propria with extension of the thrombosis to involve submucosal vessels. A slower evolution was suggested in pseudomembranous cases. In 3 cases Staphylococcus aureus was cultured from the superficial necrotic tissue at autopsy. The largest and most severe lesions were seen in those with the longest histories or those with an abrupt onset of severe shock, diarrhea and rapid death. Those with a longer history and mild intestinal symptoms were more likely to show superficial bowel mucosa involvement and included those with pseudomembranous lesions.

8658 SKIN AND SUBCUTANEOUS METASTASES FROM GASTROINTESTINAL CARCINOID TUMORS. (E.) Norman, J. L., P. J. Cunningham (Galveston Surg. Group., Tex.) and B. R. Cleveland. *Arch. Surg.* 103(6):767-769, 1971.

A 55-yr-old female was admitted with a history of bloody stools and progressively increasing constipation and pain in the lower abdomen. The abdomen was protuberant, bowel sounds hyperactive and the stool guiac test was positive. Abdominal exploration revealed a perforated sigmoid diverticulum and secondary abscess of the cul-de-sac, which was drained; a transverse colostomy was performed. Four months postoperatively she was readmitted with further weight loss, abdominal pain and a 3 week history of foul-smelling, brown, watery rectal discharge. Pelvic examination revealed an enlarged uterus and cervical biopsy showed a stage IV squamous cell carcinoma. Proctoscopy demonstrated a raised hard lesion with central ulceration and hemorrhage on the anterior wall of the rectosigmoid; a biopsy specimen of the area was reported as carcinoid tumor. Four months later, patient complained of a erythematous nontender nodule on the bridge of her nose, 2.5 mm in diameter, which was shown to be a metastatic carcinoid tumor. Of the reported cases of gastrointestinal carcinoids metastatic to the skin and subcutaneous tissue, the majority have originated from the small intestine.

8659 ROENTGEN ASPECTS OF PRIMARY APPENDICEAL INTUSSUSCEPTION. (E.) Bachman, A. L.

(Francis Delafield Hosp., New York, N. Y.) and A. R. Clemett. *Radiology* 101(3):531-538, 1971.

The authors report 3 new cases of symptomatic primary appendiceal intussusception with an emphasis on roegenological diagnosis and 4 cases of a new radiologic syndrome of primary appendiceal intussusception characterized by roentgenologic demonstration of an initial incomplete appendiceal intussusception into the cecum followed by complete reduction and the demonstration of a normal appendix and cecum in patients with no referrable symptoms. The symptomatic patients had a history of right lower quadrant pain lasting intermittently for months to several yr. In the 4 asymptomatic patients, this diagnosis was an incidental finding during barium enema as part of a diagnostic workup for constipation (2), possible colonic neoplasm (1) or as follow-up after detection (4 yr previously) of 2 tiny polyps of the sigmoid colon (1). The literature is reviewed (27 references).

8660 ANAL CONTINENCE. (E.) Duthie, H. L. (Roy. Infirm., Sheffield, England). *Gut* 12(10):844-852, 1971.

Concepts of the mechanism of anal continence are reviewed and discussed with regard to the anatomical and physiological features of the region. The anatomy of the smooth muscle, striated muscle and sensory nerve endings are described with relation to the rectum, anal canal, levator ani muscles and the external and internal anal sphincters. Physiology of sensory information from the colon, rectum and anal canal are presented. In addition, the role played by motor components in the continence mechanism are discussed with regard to high pressure changes within the anal canal and rectum presumably due to levator ani and external and internal sphincter muscle activity. The effect of the reflex of distention of the rectum on the anal canal is also mentioned. Theories explaining anal continence such as the high pressure zone in the anal canal, the angulation between the rectum and anal canal, a flutter-value effect of the anal canal, the ability of the anal canal to resist opening as well as forces around the anal canal are reviewed. Practical aspects of the problems associated with incontinent subjects are presented, with emphasis on diagnosis and diseases due to defects in sensory and/or motor functions and the avoidance of defects in anal continence due to surgical procedures in the region.

8661 COLONIC TUMOURS FOLLOWING URETERO-SIGMOIDOSTOMY. (E.) Whitaker, R. H., R. C. B. Pugh (St. Paul's Hosp., London) and D. Dow. *Br. J. Urol.* 43(5):562-575, 1971.

Three cases of carcinoma complicating ureterosigmoidostomy are reported and the relevant literature reviewed. Of the 28 patients (25 from literature and 3 herein) heretofore described, 8 patients developed adenomatous polyps, 12 adenocarcinoma, 3 transitional cell carcinoma and 3 carcinomas of indeterminate origin. Most of the patients are male, and in 20 the original lesion, for which the diversion was performed, was benign. The latent period between the anastomosis and the development of tumor was 19 yr in patients diverted for congenital or inflammatory lesions, as compared to 6 yr in patients with established malignant disease. Presenting symptoms were bowel diseases, rectal bleeding and ureteric obstruction. Prognosis is not good when tumor formation complicates a uretero-colic anastomosis, though it varies according to the tumor type that develops, and is worst when a transitional or indeterminate tumor arises. Regular surveillance is mandatory in all cases but with the first 2 groups, the possibility of additional or of recurrent, intestinal polyps should be anticipated.

8662 ELECTRON MICROSCOPIC AND RADIOAUTOGRAPHIC INVESTIGATION OF COLONIC EPITHELIUM IN RATS AFTER JEJUNECTOMY. (Rus.) Zufarov, K. A. (Med. Inst., Tashkent, USSR) and I. M. Baibekov. *Arkh. Anat. Gistol. Embriol.* 60(6):36-45, 1971.

8663 RADIOLOGICAL CASE OF THE MONTH: ACUTE FLEXURA LIENALIS SYNDROME. (E.) Gwinn, J. L. (Inst. Pediatr., Poznan, Poland), F. A. Lee and K. Kozlowski. *Am. J. Dis. Child.* 122(3):239-240, 1971.

8664 PREOPERATIVE DIAGNOSIS OF A BLEEDING CECAL ANGIOMA BY SELECTIVE ANGIOGRAPHY. (Fr.) Van Der Ghinst, M. (Acad. Surg., Paris), P. Dernier and V. Ponikelsky. *Chirurgie* 97(8): 493-498, 1971.

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8666 CROHN'S DISEASE WITH ANORECTAL MANIFESTATIONS. REPORT OF 8 CASES. (Fr.) Brondel, H., M. Rachail, R. Imbert and J. Ledru. *Grenoble Med. Chir.* 9(6):219-232, 1971.

8667 TRANSVERSE OBLIQUE APPROACH TO THE VERMIFORM PROCESS. (Rus.) Lutsenko, D. A. *Klin. Khir.* 51(5):87-88, 1971.

8668 OPERATIVE APPROACHES TO THE VERMIFORM PROCESS. (Rus.) Varlamov, V. I. and V. N. Romanenko. *Klin. Khir.* 51(5):54-56, 1971.

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(Rus.) Pomosov, D. V. (Voenno Med. Acad., Leningrad, USSR) and G. A. Kataeva. *Eksp. Khir. Anestesiol.* 16(1):37-39, 1971.

8670 DIVERTICULITIS OF THE VERMIFORM APPENDIX. (E.) Aubrey, D. A. (United Cardiff Hosps., Wales). *Can. J. Surg.* 14(3):216-217, 1971.

8671 RETRORECTAL TUMOURS. (E.) Anonymous. *Br. Med. J.* 3(5769):265-266, 1971.

8672 THE NEONATAL RESPONSE TO GASTROGRAFIN ENEMA. (E.) Rowe, M. I. (Jackson Mem. Hosp., Miami, Fla.), A. J. Furst, D. H. Altman and C. A. Poole. *Pediatrics* 48(1):29-35, 1971.

8673 SURGICAL TREATMENT OF ANORECTAL PROLAPSE. (Ger.) Betzler, H. J. (Hechingen Reg. Hosp., Germany). *Paediatr. Prax.* 10(2):241-247, 1971.

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8675 ETIOLOGICAL ASPECTS OF CARCINOMA OF THE COLON. (E.) Beazley, R. M. (U. Maryland Sch. Med., Baltimore). *Md. State Med. J.* 20(9):49-51, 1971.

8676 REVIEW OF 252 CASES OF APPENDICITIS. GENERAL PROBLEMS AND GEOGRAPHICAL PARTICULARITIES. (Fr.) Nahas, V. *Lyon Chir.* 67(2):99-101, 1971.

8677 EXPERIMENTAL INVESTIGATIONS OF INTRA-ABDOMINAL RESECTION OF THE RECTUM WITH SUTURELESS END TO SIDE ANASTOMOSIS. (Rus.) Kimbarovskaia, E. M. and L. V. Zaitseva. *Klin. Khir.* 51(5):74-77, 1971.

8678 SOME IMPROVEMENTS OF SURGICAL TREATMENT OF ACUTE AND CHRONIC APPENDICITIS. (Rus.) Karavanov, G. G. *Klin. Khir.* 51(5): 78-82, 1971.

8679 TWO-STAGE APPROACH IN APPENDECTOMIES. (Rus.) Mariiev, A. I. and A. N. Poliakov. *Klin. Khir.* 51(5):82-84, 1971.

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8682 A CASE OF VOLVULUS OF THE VERMIFORM PROCESS. (Rus.) Podmaistrovich, V. I. *Klin. Khir.* 51(5):91-92, 1971.

8683 INTESTINAL OBSTRUCTION DUE TO ACUTE APPENDICITIS. (Rus.) Riabukhin, K. M. and V. I. Ilchenko. *Klin. Khir.* 51(5):92-93, 1971.

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8689 DIAGNOSIS IN INFLAMMATION OF THE VERMIFORM PROCESS. (Rus.) Baranov, A. N. *Klin. Khir.* 51(5):56-59, 1971.

8690 SURGICAL TREATMENT OF APPENDICITIS. (Rus.) Veller, D. G. *Klin. Khir.* 51(5):59-62, 1971.

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OF THE LARGE INTESTINE ASSOCIATED WITH CANCER. (Rus.) Vinogradova, O. I. *Khirurgiia (Mosk.)* 47(5):105-110, 1971.

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8694 COLONIC ACUTE DIVERTICULITIS. EXPERIENCE OF A SURGICAL DEPARTMENT. (Sp.) Dujovich, A. (Israelita Hosp., Buenos Aires, Argentina), S. Beresten and H. M. Akerman. *Dia Med.* 43(4):100-101, 1971.

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8700 ILEOCECAL FISTULA: REPORT OF AN UNUSUAL CAUSE. (E.) Figiel, L. S. (Grace Hosp., Detroit, Mich.) and S. J. Figiel. *J. Abdom. Surg.* 13(6):131-132, 1971.

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8703 MATERNAL MORTALITY FOLLOWING SPONTANEOUS RUPTURE OF THE SIGMOID COLON. (E.) Volk, G. E. (USAF Reg. Hosp., Langley, Va.) and R. E. Harris. *Va. Med. Mon.* 98(5):258-261, 1971.

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8711 ROENTGEN DIAGNOSIS OF PERFORATIONS OF THE SIGMOID COLON. (Ger.) Frohlich, G. (City Hosp., Karlsruhe, Germany) and W. Konig. *Radiologe* 11(7):260-263, 1971.

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8715 SEVERE RECTAL BLEEDING FROM AN INTRAMURAL HEMATOMA OF THE SIGMOID. (E.) Schiller, M. (Ohio State U. Coll. Med., Columbus), T. S. Morse and T. R. Frye. *Pediatrics* 48(1):146-148, 1971.

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8717 OBLITERATING HYPERPLASIA OF THE LYMPHATIC TISSUE OF THE APPENDIX. (Hun.) Oseh, I. *Morphol. Igazs. Orv. Szle* 11(2):138-141, 1971.

8718 TUMORS OF THE CECUM AND THE DISTAL ILEUM DUE TO HODGKIN'S DISEASE. (Por.) Da Silva, C. (Civil Hosp., Lisbon, Portugal). *Med. Univers. (Lisboa)* 14(3):173-181, 1971.

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8720 ROENTGEN DIAGNOSIS OF GRANULOMATOUS COLITIS (CROHN'S DISEASE OF THE LARGE INTESTINE). AN ANGIOGRAPHICAL CONTRIBUTION. (Ger.) Dombrowski, H. (Univ. Med. Clin., Marburg, Germany). *Radiologe* 11(7):264-273, 1971.

See also numbers: 8126, 8533, 8603, 8987

ULCERATIVE COLITIS

8721 CANCER RISK AND LIFE EXPECTANCY OF CHILDREN WITH ULCERATIVE COLITIS. (E.) Devroede, G. J. (Mayo Clin., Rochester, Minn.), W. F. Taylor, W. G. Sauer, R. J. Jackman and G. B. Stickler. *N. Engl. J. Med.* 285(1):17-21, 1971.

The records of 601 children 14 yr old or less who were reported to have had ulcerative colitis when first seen at the Mayo Clinic from 1919 to 1965 were examined. All who had not had proctoscopic and radiographic examination of the large bowel at the initial examination were excluded. A total of 396 patients are included in the final report. Survival rates at 10, 20, 30 and 43 yr were 78%, 58%, 39% and 27%, resp. In the whole group there was no difference in mortality rates between sexes although there was an increased mortality rate among females during the first 15 yr of the disease. Survival was not related to age at onset of disease. Survival was shorter in those with involvement of the entire colon than in those with rectal involvement alone. There was no significant improvement in survival rates after 1953 when the use of corticosteroids was initiated. There was a strong relationship between the duration of disease and extent of involvement. Cancer developed in 52 of the 396 patients. It occurred in only 3% of the patients during the first 10 yr after onset, but thereafter colon cancer developed in 20% of affected children in each decade, and the probability of development of cancer 35 yr after onset was 43%. There was no significant difference in prevalence of cancer between sexes but the probability was somewhat higher in males. The risk of cancer increased with extent of colitis. The long term survival (at 20 yr) was better for those who underwent proctocolectomy than among those who did not. Mortality from disease occurred in 2 of 22 (9%) operated on after 15 yr of age and in 6 of 18 (33%) operated on prior to 15 yr of age.

8722 RADIOLOGICAL SIGNS OF ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE COLON. (E.) Stanley, P. (St. Bartholomew's Hosp., London), I. K. Fry, A. M. Dawson and N. Dyer. *Clin. Radiol.* 22(4):434-442, 1971.

Films of single contrast barium enema examinations of 65 patients with either Crohn's disease or ulcerative colitis were studied in order to determine the accuracy of various radiological signs in differentiating between the 2 conditions. General features (distribution and postrectal space), Haustral pattern, mucosal signs (filling defects, ulcers, mucosal pattern), and complications were all assessed. Thumbprinting, coarse serration, decreased length and caliber, swollen organized folds and shallow ulcers were signs occurring with comparable frequency in Crohn's disease and ulcerative colitis. Signs occurring between 3 and 10 times more commonly in Crohn's disease or ulcerative colitis were abnormal haustra and nodularity in Crohn's disease and total colitis, rectal involvement, increased postrectal space, absent haustra and fine serration in ulcerative colitis. Discontinuity, asymmetrical involvement and a right-sided distribution was characteristic (at least 10 times more commonly seen) of Crohn's disease as were cobblestones, disorganized folds and deep ulcers. Strictures and fistulae occurred exclusively in Crohn's disease. Characteristic features of ulcerative colitis were a smooth contour, pseudopolyps, hazy longitudinal folds and mucosal effacement.

8723 SKIN MANIFESTATIONS IN CROHN'S DISEASE OF THE RECTUM. (Fr.) Duperrat, M. B. (St. Louis Hosp., Paris), M. Hivet and G. Noury. *Ann. Dermatol. Syphiligr. (Paris)* 98(3):275-280, 1971.

A 42-yr-old woman with Crohn's disease of the rectum achieved remission after recto-colectomy and was asymptomatic at the time of report.

8724 ERRORS IN THE DIAGNOSIS OF NONSPECIFIC ULCERATIVE COLITIS AND AMEBIC DYSENTERY. (Rus.) Karnaukhov, V. K. and R. A. Firsova. *Klin. Med. (Mosk.)* 49(5):114-118, 1971.

8725 MYASTHENIA GRAVIS. ULCERATIVE COLITIS AND LICHEN PLANUS. (E.) Miller, T. N. (Westminster Hosp., London). *Proc. R. Soc. Med.* 64(8):807-808, 1971.

8726 INDICATIONS FOR SURGICAL TREATMENT OF ULCERATIVE COLITIS. (It.) Stocchi, F. (St. Spirito Inst. Rome). *Policlinico* [*Prat.*] 78(4):143-147, 1971.

See also number: 8655

8727 THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (E.) Simopoulos, A. P. (NIH, Bethesda, Md.), A. Lapey, T. F. Boat, P. A. di Sant' Agnese and F. C. Bartter. *Pediatr. Res.* 5(11):626-632, 1971.

Five patients with cystic fibrosis of the pancreas had elevated plasma renin activity, supine renin 497-595 compared with normal values of 228 nanograms/100 ml plasma on 109 mEq sodium intake 24 hr. The patients had normal renin release mechanisms as far as postural changes are concerned, since renin activity increased normally (594-875) with the upright position. High aldosterone secretion rates (161-445), seen on 109 mEq sodium intake, were probably secondary to the abnormally high renin release. Renin activity, however, failed to suppress on the high salt intake; furthermore, patients with cystic fibrosis of the pancreas did not gain the expected weight on the high salt intake. This state of hyperaldosteronism secondary to renin release probably results from adaptation to frequent excessive sodium losses with the sweat, with consequent contraction of extracellular volume.

8728 THE RISING INCIDENCE OF CANCER OF THE PANCREAS - FURTHER EPIDEMIOLOGIC STUDIES. (E.) Krain, L. S. (11734 Wilshire Blvd., Los Angeles, Calif.). *J. Chronic Dis.* 23(10-11): 685-690, 1971.

Study of the California Tumor Registry showed socioeconomic class was inversely related to pancreatic cancer incidence in males and females, cancer of the pancreas being more common in county than in private hospitals. The highest incidence of pancreatic cancer was seen in Negro males, followed by Chinese males and Caucasian males. No significant racial differences were observed among females. Negroes showed the greatest percentage increase in pancreatic cancer mortality rates in the age-specific grouping under 50 yr for the period 1950-1963.

8729 THE TECHNIQUE AND RESULTS OF PANCREATIC-DUODENAL RESECTION IN CARCINOMA OF THE HEAD OF THE PANCREAS OR DUODENUM. (Ger.) Weitz, G. (Heidberg Gen. Hosp., Hamburg, Germany). *Chirurg* 42(8):379-381, 1971.

8730 PANCREATIC TUMORS WITH ENDOCRINE ACTIVITY. (Sw.) Andersson, H. (Sahlgrenska Hosp., Goteborg, Sweden), G. Dotevall and A. Walan. *Lakartidningen* 68(36):3977-3984 & 4042, 1971.

8731 PANCREATIC FISTULAS AFTER ENUCLEATION OF ADENOMAS. THEIR PREVENTION. (Sp.) Anonymous. *Dia Med.* 43(4):113-114, 1971.

8732 CYSTADENOCARCINOMA OF THE TAIL OF THE PANCREAS. (Fr.) Hivet, M. (Alma Surg. Ctr., Paris) and B. Lagadec. *Sem. Hop. Paris* 47(23):1530-1533, 1971.

8733 PATHOLOGY OF THE SPHINCTER OF WIRSUNG'S DUCT. (Sp.) Anonymous. *Dia Med.* 43(4):117-118, 1971.

8734 PATHOLOGIC FINDINGS IN THE PANCREAS OF MICE INFECTED WITH COXSACKIEVIRUS B4. (E.) Burch, G. E. (Tulane U. Sch. Med., New Orleans, La.), C. Y. Tsui, J. M. Harb and H. L. Colcolough. *Arch. Intern. Med.* 128(1):40-47, 1971.

8735 SUPERSELECTIVE PANCREATIC ARTERIOGRAPHY. (Fr.) Tavernier, J. (St. Andre Hosp., Bordeaux, France), G. Delorme and M. Fagola. *Ann. Radiol. (Paris)* 14(7-8):555-566, 1971.

8736 SARCOMA OF THE HEAD OF THE PANCREAS. (Fr.) Ionescu, M., C. Burdescu, M. Vasilescu and M. Rusu. *Lyon Chir.* 67(3):230-232, 1971.

8737 PANCREATOGRAPHY IN THE DIAGNOSIS OF DISEASES OF THE PANCREAS. (Rus.) Milonov, O. B., V. I. Sokolov and R. K. Vasiliev. *Khirurgiia (Mosk.)* 47(7):96-102, 1971.

8738 TRANSPAPILLARY PANCREATOGRAPHY UNDER DUODENOSCOPY. (Fr.) Jeanpierre, R. and L. Leger. *Chirurgie* 97(7):489, 1971.

See also number: 8785

8739 ANAPHYLACTIC SHOCK SECONDARY TO INITIAL TRASYLOL ADMINISTRATION. (E.) Bauer, J., S. Futterman (87-01 Midland Pkwy., Jamaica, N. Y.) and D. A. Dreiling. *Am. J. Gastroenterol.* 56(6):542-544, 1971.

A 66-yr-old, white female patient was 1 of 52 patients taking part in a double-blind study evaluating the clinical effectiveness of Trasylol in acute pancreatitis and also as prophylaxis against postoperative pancreatitis following surgery in the anatomic region of the pancreas. This patient, having received a subtotal gastrectomy and a gastrojejunostomy for gastric ulcer, became dyspneic, cyanotic, with loss of consciousness and response to pain stimuli within 2 min after injection of Trasylol. She responded well to epinephrine and recovered uneventfully. The patient had no history of allergy and denied previous contact with Trasylol. Cross-sensitization may have been responsible for the anaphylactic reaction in this patient. Trasylol's effect in the therapy and prophylaxis of acute and postoperative pancreatitis is still open to question.

8740 EXPERIMENTAL PANCREATITIS IN PIGS. (E.) Thorpe, C. D. (U. Michigan Med. Ctr., Ann Arbor) and C. F. Frey. *Arch. Surg.* 103(6): 720-733, 1971.

Neither pig bile nor bile salt suspension produced lethal pancreatitis in pigs, despite forceful injection of volumes greater than 0.8 ml/kg. All pigs in this group presented biochemical and anatomic evidence of pancreatic inflammation, with amylase elevation similar to the pattern in dogs. Petechial hemorrhage and edema occurred immediately following injection, while at autopsy the gland was extensively necrotic with microscopic evidence of suppuration and bacterial colonization; pancreatic pseudocysts occurred in 3 pigs. Pancreatic fibrosis and atrophy were evident in postmortem specimens from all pigs who had received trypsin injection. Bile salt-trypsin injection produced high mortality in pigs despite use of low infusion pressure. Pancreatic parenchyma was totally obliterated, with pronounced interstitial hemorrhage. Unlike the extensive manipulations required to create experimental canine pseudocysts, taurocholate sodium injection sufficed to induce formation of mature pig pancreatic pseudocysts. Cultures from these cysts revealed enteric flora similar to that recognized in the human disease.

8741 IMPORTANCE OF NUTRITION IN THE PATHOGENESIS OF EXPERIMENAAL PANCREATITIS IN THE DOG. (E.) Goodhead, B. (6700 Bellaire Blvd., Houston, Tex.). *Arch. Surg.* 103(6): 724-727, 1971.

In 8 dogs maintained on a standard 1400 caloric diet, injection of autologous bile and trypsin into the main pancreatic duct produced hemorrhagic pancreatitis, usually severe, affecting mainly the head and body of the gland. Microscopically there were extensive areas of parenchymal necrosis and interlobular edema. Hemorrhagic pancreatitis was present in only 2 of 8 experimentally undernourished dogs. In the remaining animals there was a variable amount of interlobular edema associated with moderate leukocytic infiltration. Pancreatic proelastase and trypsinogen levels were normal in well-fed animals and diminished in the undernourished dogs. Thus the preoperative nutritional status of the dog must be taken into account when planning experiments involving the pathogenesis and the evaluation of new therapeutic agents in acute pancreatitis.

8742 THE ROLE OF THE THYROID GLAND IN THE HYPOCALCEMIA OF ACUTE PANCREATITIS. (E.) Shieber, W. (Jewish Hosp., St. Louis, Mo.), R. Kingsbury and A. E. Baue. *Surg. Forum* 22: 333-334, 1971.

Acute pancreatitis was induced in 5 thyroidectomized dogs with intact parathyroid glands and in 7 normal dogs by the injection of trypsin into the pancreatic duct. Significant serum calcium decreases were observed in the intact animals, while no changes in serum calcium were seen in the thyroidectomized dogs. Results suggest that the thyroid gland is involved in the development of hypocalcemia during acute pancreatitis.

8743 PANCREATITIS AS A COMPLICATION OF REGIONAL ENTERITIS OF THE DUODENUM. (E.) Legge, D. A. (Mayo Clin., Rochester, Minn.), H. N. Hoffman, II and H. C. Carlson. *Gastroenterology* 61(6):834-837, 1971.

The records of 10 patients with surgically proven regional enteritis of both the duodenum and the distal portion of the ileum were reviewed to assess the incidence of pancreatitis as a complication. Of these 10 patients, 3 had evidence of pancreatitis as indicated by elevated serum and urine amylase levels. The usual causes of pancreatitis, i.e. alcoholism and cholelithiasis or choledocholithiasis as well as hyperparathyroidism, were excluded in each patient. In 2 of the 3 cases, the elevated amylase values were substantiated by surgical findings. The pancreatic dysfunction was probably due to reflux of duodenal contents into the pancreatic ducts. This may have been the result of a fistula between the duodenum and the pancreatic duct or of reflux through the ampulla damaged by inflammation of adjacent bowel. Thus, obtaining pancreatic enzyme studies for any patient with known or suspected involvement of the duodenum with regional enteritis seems to be indicated.

8744 ACUTE POSTOPERATIVE PANCREATITIS. (Rus.) Pipia, I. K. and A. V. Talia. *Khirurgiia (Mosk.)* 47(7):80-85, 1971.

8745 THE DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS IN A DISTRICT HOSPITAL SURGICAL DEPARTMENT. (Cz.) Jiran, B. (Tabor Hosp., Czechoslovakia). *Rozhl. Chir.* 50(5):261-268, 1971.

8746 EARLY TREATMENT BY PERITONEAL DIALYSIS IN ACUTE HEMORRHAGIC PANCREATITIS. (Sw.) Gjessing, J. (Sundsvalls Hosp., Sweden) and S. Jacobs. *Nord. Med.* 86(31):927-930, 1971.

8747 PANCREATITIS: AETIOLOGICAL ASSOCIATIONS. (E.) Tasman Jones, C. (Auckland Hosp., New Zealand). *NZ Med. J.* 73(468):283-284, 1971.

8748 METHODS OF EXAMINATION AND TREATMENT IN INTENSIVE CARE OF ACUTE PANCREATITIS. (Cz.) Bartos, V. (Charles U. Sch. Med., Hradec Kralove, Czechoslovakia) and V. Brzek. *Lek. Zpr. Lek. Fak. Karlova Univ.* 16(3-4):81-89, 1971.

8749 CONSERVATIVE TREATMENT OF ACUTE AND CHRONIC PANCREATITIS. (Ger.) Neumayr, A. (Kaiserin Elisabeth Hosp., Vienna). *Med. Klin.* 66(25):905-910, 1971.

8750 B-CELL STIMULATION IN CHRONIC AND CHRONIC RELAPSING PANCREATITIS. (Ger.) Grabner, W. (U. Erlangen-Nuremberg Med. Clin., Germany), D. Bergner and H. Scharrer. *Klin. Wochenschr.* 49(13):765-767, 1971.

8751 ESSENTIAL HYPERPLIPEMIA AND CHRONIC RECURRENT PANCREATITIS. (THE EFFECTS OF LEFT PANCREATECTOMY AND SPLENECTOMY). (Rum.) Iliescu, G. (Alexandru Sahia Hosp., Bucharest), G. Radulescu, G. Popa and J. Splouchal. *Med. Inrerna (Bucur.)* 23(6):759-767, 1971.

8752 HIGH LIVER GLYCOGEN IN HEREDITARY FRUCTOSE INTOLERANCE. (E.) Cain, A. R. R. (Newcastle Gen. Hosp., London) and B. E. Ryman. *Gut* 12(11):929-932, 1971.

At the age of 19 months a female child was admitted with a history of recurrent vomiting, some diarrhea, persistent anorexia, weight loss. Physical examination revealed superficial infections and hepatomegaly. Blood sugar (44 mg%) and plasma bicarbonate (10 mEq/liter) were low, liver glycogen was increased, and amino acids were increased in the urine. Galactosemia was excluded by demonstration of normal galactose-1-phosphate uridyl transferase in the child's RBC. Glycogen storage disease was considered likely, although normal response to glucagon was puzzling. The child died of terminal bronchopneumonia following the aspiration of vomit and at necropsy was found to have an enlarged fatty liver. No fructose 1-phosphate aldolase activity was found in a necropsy liver sample while fructose 1,6-diphosphate aldolase activity was less than 58% that of a control. Hereditary fructose intolerance and glycogen storage disease have been confused in the past on clinical grounds, but high liver glycogen levels have not been previously reported in hereditary fructose intolerance.

8753 BIOCHEMICAL AND FINE STRUCTURAL STUDIES ON BRAIN AND LIVER BIOPSIES IN ASPARTYLGLUCOSAMINURIA. (E.) Palo, J. (U. Helsinki Dept. Neurol.), P. Riekkinen, A. Arstila and S. Autio. *Neurology* 21(12):1198-1204, 1971.

Brain and liver biopsies were performed on 2 patients with aspartylglucosaminuria (AGU) and biochemical and fine structural studies were performed. Numerous large electron-dense lysosomes containing membranous material were seen in the glial cells and neurons of the brain biopsy specimens. In the hepatocytes of the liver biopsies numerous large lysosomes were also seen; however, these were much less electron-dense and seemed to contain pale flocculent material. Whereas the activity of N-aspartyl-β -glucosaminidase was decreased to about one-fifth the normal level, the activities of N-acetyl- β-glucosaminidase were from 4-6 times higher than controls and the values for N-acetyl- β-galactosaminidase, proteinase and β-glucuronidase were somewhat less increased in both brain and liver biopsy specimens. The activity of β-fucosidase was moderately decreased. No accumulation of any of the acidic or neutral amino acids or of 2-acetamido-1-β-L-aspartamido)-1,2-dideoxy-β-D-glucose (AADG) was observed. Thus, a lysosomal nature of this disease seems to be indicated.

8754 CURRENT STATUS OF SURGICALLY CREATED PORTASYSTEMIC SHUNTS IN THE MANAGEMENT OF PORTAL HYPERTENSION. (E.) Moody, F. G. (U. Alabama Sch. Med., Birmingham) and J. S. Aldrete. *Am. Surg.* 37(10):605-612, 1971.

Elective decompressive procedures were carried out on 23 of 35 patients with portacaval hypertension. An end-to-side portacaval shunt was performed in 8 patients in whom hepatic function was judged to be moderate to good. A side-to-side shunt was performed in 6 patients in whom hepatic function was poor, or ascites was hard to manage. An end-to-side splenorenal shunt with splenectomy was performed in 3 cases of symptomatic hypersplenism, 3 cases of bleeding varices accompanied by a large spleen and a splenic vein larger than 10 mm in diameter by splenoportography, and in 2 cases of portal vein thrombosis. An end-to-side caval mesenteric shunt was performed in 1 patient who had had a splenectomy in childhood, and a previous attempt to construct a portacaval shunt for bleeding varices secondary to portal hypertension due to cavernous transformation of the portal vein. Of 8 patients operated on for persistent variceal hemorrhages, the operative mortality was 3 within 5 days, and a fourth patient died after 2 months, while the other 4 recovered. Of the 23 patients evaluated at follow-up, 18 were alive.

8755 THE SIGNIFICANCE OF BILE ACIDS IN GASTROINTESTINAL AND HEPATIC DISEASE. (E.) Hofmann, A. A. F. (Mayo Clin., Rochester, Minn.) and F. Kern, Jr. *DM* November:1-38, 1971.

Functions of bile acids in the liver in relation to bile acid synthesis and regulation, bile formation and enterohepatic circulation are described. The role of bile acids in formation in the intestinal lumen of micelles that transport lipolytic products and other lipids (fat-soluble vitamins and cholesterol) to the small intestinal mucosal surface is discussed. Also described are their regulation of metabolic activity in the small intestinal mucosal cell and control of salt and water movement in the large intestine. A major factor in the importance of understanding bile acid metabolism has been recognition of the pathogenetic significance of bile acids in several common disease conditions (cholesterol gallstones), syndromes of bacterial overgrowth, diarrhea and steatorrhea in patients with various intestinal disorders or intestinal resection, and possibly in parenchymal liver disease. In addition, cholestyramine, an anion exchange resin that binds bile acids in the intestinal lumen, thereby interrupting their enterohepatic cycling and increasing their fecal excretion, has given promising results in the treatment of familial hypercholesterolemia, pruritis associated with obstructive hepatobiliary disease, and diarrhea associated with bile acid malabsorption in patients with ileal resection.

8756 HEPATIC GLYCOGENOSIS DUE TO PHOSPHORYLASE DEFICIENCY. LIMITATIONS OF ENZYME STUDIES ON LIVER BIOPSY SPECIMENS. (E.) Wagner, R. (New England Med. Ctr. Hosps., Boston, Mass.), F. Huijing and E. Porter. *Am. J. Med.* 51(5): 685-691, 1971.

There have been many reclassifications and subclassifications, with clinical variants, described for the glycogen storage diseases as newer methods of enzyme identification become available. Since 1947 enzyme studies of polymorphonuclear WBC have facilitated the differential diagnosis of many of these diseases. These studies offer insight into the molecular basis of the disease and have the additional advantage of ease of access as compared to liver biopsy with its biochemical complications. Lymphocytes and platelets may also be used if results are reported as specific activity of enzyme per mg supernatant. In this study 2 boys, maternal second cousins, are described. The first boy had been diagnosed 3 yr previossly as having type VI glycogen storage disease. The work-up on the second boy revealed clinical discrepancies and variation between liver and polymorph phosphorylase activity. Polymorph WBC studies of the subject and his parents revealed the subject to be deficient in phosphorylase and phosphorylase kinase with a Michaelis constant (Km) for phosphorylase kinase 10 times normal. His mother's Km for the enzyme was 5 times normal; his father's was normal. The study of WBC enzymes gave more reliable results and a sex-linked glycogen storage disease with low phosphorylase kinase activity was diagnosed.

8757 ALPHA$_1$ ANTITRYPSIN IN THE LIVERS OF PATIENTS WITH EMPHYSEMA. (E.) Lieberman, J. (City of Hope Natl. Med. Ctr., Duarte, Calif.), C. Mittman and H. W. Gordon. *Science* 175(4017):63-65, 1972.

Liver tissue was obtained from 10 patients by percutaneous liver biopsy, and from 4 at autopsy. All 14 had lung disease, but only 1 had evidence of liver disease, and this was related to metastatic carcinoma. Eight specimens were from patients with a severe deficiency of α_1-antitrypsin (due to Pi^{ZZ} phenotype) and 6 were from patients with an intermediate deficiency (1 Pi^{SS} and 4 Pi^{MZ}). Of the 14 liver specimens, 12 had discrete, rounded, membrane-enclosed cytoplasmic liver globules, which were not seen in any of 7 control patients with emphysema with normal or elevated α_1-antitrypsin concentrations. These globules were 3-20 micrometers in diameter and were faintly eosinophilic with hematoxylin-eosin staining and moderately-to-strongly PAS-positive after digestion with amylase. The number of globules varied greatly between cells. Globule-containing cells had no particular lobular localization in the liver biopsy specimens, although they tended to cluster around portal areas and hepatic veins in autopsy specimens. Autopsy specimens have more globule-containing cells. Histochemically, the globules had a non-lipid, glycoprotein composition. Application of fluoroscein-conjugated antiserum for human α_1-antitrypsin to liver specimens revealed positively staining structures that corresponded in size, shape and cellular structure localization to the globules.

8758 GREEN JAUNDICE. A STUDY OF SERUM BILIVERDIN, MESOBILIVERDIN AND OTHER GREEN PIGMENTS. (E.) Greenberg, A. J., I. Bossenmaier and S. Schwartz (Univ. Hosps., Minneapolis, Minn.). *Am. J. Dig. Dis.* 16(10): 873-880, 1971.

Three patients with deep jaundice secondary to poorly supervised chloramphenicol treatment as well as chronic alcoholism, biliary atresia, and ineffective erythropoiesis, resp., are described. A serum biliverdin concentration of 3 mg%, found in the first patient, may be the highest value ever recorded. Despite the fact that bilirubin concentration was 10-20 times greater than that of biliverdin, the green color of biliverdin predominated. Spectral analysis of the diluted serum revealed maximum absorption at 653 millimicrons (mμ) with an absorption shoulder at 653 mμ and a bilirubin type absorption maximum at about 450 mμ. A mixture of biliverdin, mesobiliverdin and related pigments appeared to contribute to the green color observed.

8759 HEMODYNAMICS OF EXPERIMENTAL PORTACAVAL TRANSPOSITION. A PROMISING PROCEDURE FOR DECOMPRESSION OF PORTAL HYPERTENSION. (E.) Kreuzer, W. and W. G. Schenk, Jr. (State U. New York Dept. Surg., Buffalo). *Arch. Surg.* 103(5): 585-589, 1971.

Studies were performed on dogs for 12 weeks following portacaval transposition. Cardiac outflow was not affected, while total hepatic blood flow was increased 27%, but this was of borderline significance. Portal inflow through the caval source was increased significantly by 50%, while hepatic artery flow was decreased significantly by 32%. Systemic arterial pressure remained normal. Pressure in the hepatic venous inflow tract was decreased below that seen in the portal vein in controls and was almost that of the control cava. There was a slight but consistent decrease in total serum proteins, and this was seen to be essentially uniform for all fractions by protein electrophoresis. There were consistent elevations of serum glutamic-pyruvic transaminase, with no alterations of the serum bilirubin or alkaline phosphatase, or in BSP retention values. Grossly the liver appeared to be moderately enlarged showing soft contours and edges. The spleen appeared quite small, and the kidneys unremarkable. Liver specimens obtained at 2 and 14 days after transposition appeared normal. At 6 weeks there was minimal fatty change of hepatocytes. This was more pronounced at 12 weeks, with more frequent transformation of the hepatocytes to a cloudy balloon-like cell. There was slight splenic atrophy and no alteration of renal histology.

8760 A CHILD WITH LACTACIDEMIA AND FRUCTOSE DIPHOSPHATASE DEFICIENCY IN THE LIVER. (E.) Hülsmann, W. C. (Sch. Med., Rotterdam, Netherlands) and J. Fernandes. *Pediatr. Res.* 5(11):633-637, 1971.

A female infant with a probable hereditary progressive liver disorder and muscular hypotonia, associated with a persistent severe lactacidemia was studied. The elevated levels of lactate during fasting observed initially, further increased in oral glucose, galactose and fructose tests and the reactive fall of glucose at the end of the glucose test was enhanced. Insulin levels were normal. Oral casein after a fast further increased lactate levels, but the glucose level gradually declined to hypoglycemic values. Glycolysis was intact, but an impairment of gluconeogenesis probably existed. Enzyme assays of liver tissue revealed that fructose-1,6-diphosphatase was clearly deficient. Clinical symptoms were feeding difficulties with progressive wasting, moderate hepatomegaly, and muscular hypotonia; death occurred at 6 months.

8761 HEMODYNAMIC ALTERATIONS CAUSED DURING ORTHOTOPIC LIVER TRANSPLANTATION IN HUMANS. (E.) Pappas, G. (U. Colorado Sch. Med., Denver), W. M. Palmer, G. L. Martineau, I. Penn, C. G. Halgrimson, C. G. Groth and T. E. Starzl. *Surgery* 70(6):872-875, 1971.

Hemodynamic measurements were performed on 6 patients during orthotopic liver transplantations. Alterations became apparent before any of the vessels were clamped, while the host liver was being mobilized. During the anhepatic phase (with clamping of the portal vein and inferior vena cava), the cardiac index, stroke volume index, and mean arterial pressure fell 43,39 and 18%, resp. Simultaneously, the peripheral vascular resistance rose by 71%, but the pulse rate rose only 4%. Following revascularization of the new liver and during the immediate postoperative period, hemodynamic alterations reverted toward pretransplantation levels. Central venous pressure did not change significantly during the operation. Although these changes did occur during transplantation, careful monitoring and appropriate therapy may prevent any permanent harmful effects.

8762 ARTERIOVENOUS FISTULA IN THE PORTAL CIRCULATION. (E.) Van Way, C. W., III (Vanderbilt U. Med. Ctr., Nashville, Tenn.), J. M. Crane, D. H. Riddell and J. H. Foster. *Surgery* 70(6):876-890, 1971.

Four cases of portal arteriovenous fistulas are presented, and 57 cases previously reported in the English literature are reviewed in order to delineate characteristics of the lesions. Fifty-two of the 61 patients had an abdominal bruit, and 16 presented with either hematemesis or ascites. In the diagnostic evaluation, angiography was of great value in defining the lesion; however, simple auscultation of the abdomen was the most effective means of detection. The most common etiologies were rupture of a pre-existing aneurysm of the hepatic or splenic artery, penetrating trauma (gunshot wound), and those appearing as postoperative complications. When possible, treatment should entail excision; however, when the vessels cannot be sacrificed, reconstruction, or as a last resort, ligation of the vessels should be carried out. Portal hypertension may still exist after surgical intervention, and the leading cause of postoperative death was variceal bleeding. The possible complications of this lesion indicate the necessity of surgical intervention when the presence of a portal arteriovenous fistula is demonstrated.

8763 CEREBRAL EDEMA: A MAJOR COMPLICATION OF MASSIVE HEPATIC NECROSIS. (E.) Ware, A. J., A. N. D'Agostino and B. Combes (U. Texas Southwestern Med. Sch., Dallas). *Gastroenterology* 61(6):877-884, 1971.

The records of 32 patients who died of massive hepatic necrosis and who underwent complete autopsies were reviewed to determine the incidence of cerebral edema in these patients. Cerebral edema was described in 16 of the 32 patients whose brains were examined at autopsy. This was manifested by flattening of the gyri with partial obliteration of the sulci, compression and narrowing of the lateral ventricles, and poor differentiation of white and gray matter on section. Patients with cerebral edema were significantly younger than those without this change, the mean age being 21 yr for those with cerebral edema and 47 yr for those without. Twelve of the 16 patients with cerebral edema remained in stage IV coma for more than 24 hr prior to death (9 for more than 48 hr), compared with just 3 of the 16 patients without cerebral edema. Terminal azotemia was less common in those with cerebral edema (4 with and 10 without cerebral edema), as was the likelihood of acidosis. No significant difference between the 2 groups was found with respect to sex distribution, the cause of hepatic necrosis, the presence of acute hemorrhage, infection, hypotension, hypoglycemia, anemia or the height of the serum bilirubin level. There was no correlation between the form of therapy and the occurrence of cerebral edema.

8764 EFFECT OF THE PARTIAL CONSTRICTION OF PORTAL VEIN ON RENAL HYPERTENSION IN THE THE RAT. (E.) Sonkodi, S. (Szeged U. Med. Sch., Hungary), L. Perényi and Ö. T. Zoltán. *Angiologica* 8(2):77-82, 1971.

Albino rats were split into 4 groups; groups 1 and 2, with clips placed on the left renal artery and right kidney removed, had their portal veins constricted 1 week prior to and 10 weeks following the above-mentioned intervention, resp. Rats in groups 3 and 4 differed only in that their right kidney was untouched. In groups 1 and 3, control levels of hypertension induced (176.6 mm Hg, 163 mm Hg, resp.) were reduced (149 mm Hg, 129 mm Hg) at the twentieth week. In those groups (2 and 4) where the portal vein constriction was performed in the tenth week after hypertensive surgery, there was no change in the average blood pressure just after the portal vein constriction; however, 2-3 weeks after the operation, the blood pressure began gradually to decrease in both groups. Thus partial constriction of the portal vein has a protective effect on the development of renal hypertension or decreases the developed hypertension, resp.

8765 DIAGNOSIS OF LIVER FUNCTION WITH COLLOIDAL ^{113m}INDIUM. (Ger.) Franke, W.-G. (Carl Gustav Carus Med. Acad., Dresden, Germany), B. A. Johanssen and K. Hennig. *Z. Gesamte Inn. Med.* 26(20):629-634, 1971.

Among normal subjects, the time required for elimination of 50% of the radioactivity from the peripheral circulation, following i.v. injection of a gelatin-stabilized, phosphate-buffered, neutral colloid of ^{131m}Indium (200-750 μc, by way of a cubital vein) ranged from 1.2-1.5 min., correlating directly with the uptake of the agent by the liver, as confirmed by simultaneous scintigraphic studies. Among an unspecified, small number of patients with hepatic carcinoma, liver metastases, or cirrhosis of the liver, this 50%-elimination time was significantly prolonged; among an unspecified number with osteomyelofibrosis, it was significantly shortened; among an unspecified number with polycythemia vera, it was either accelerated or prolonged, being outside normal limits in all instances. In all of the patients studied, total liver uptake was decreased, as compared to controls, while uptake by the spleen was correspondingly increased. It is concluded that the method is a reliable indicator of altered functioning of the reticuloendothelial system in the liver.

8766 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Ozdemir, A. I. (West Virginia U. Med. Ctr., Morgantown) and J. R. Lancaster. *Arch. Surg.* 103(6):684-687, 1971.

Percutaneous transhepatic cholangiography was diagnostic in 13 of 17 patients. Case histories revealed that a normal common bile duct demonstrated by percutaneous transhepatic cholangiography and chronic hepatitis shown by liver biopsy saved the patient from unnecessary surgery. Common bile duct stones and strictures were identified and localized preoperatively, thereby saving time at the operating table. Carcinomas of the gallbladder and common bile duct were also diagnosed with the use of percutaneous transhepatic cholangiography. Bile leakage, a major complication of the procedure, was avoided by use of the Longdwel needle and aspirating bile and contrast medium from the biliary tract at the end of the procedure with saline irrigation. Temporary decompression allows the puncture site to seal off before the intraductal pressure rises again. The use of the Teflon catheter instead of a needle reduces the chance of internal hemorrhage and injury to the liver.

8767 THE PROBLEM OF DONORS IN TRANSPLANTING HUMAN LIVERS. (Ger.) Lie, T. S. (Univ. Surg. Clin., Bonn-Venusberg, Germany). *Bruns Beitr. Klin. Chir.* 218(8):679-686, 1971. (26 references)

A review of the problems involved in human liver transplants includes a report of 3 cases in which death after 205, 7 and 7 days was due to delayed rejection, hepatic ischemia complicated by respiratory failure, and thrombosis of the hepatic artery complicated by renal failure, resp.

8768 LEIOMYOSARCOMA OF INFERIOR VENA CAVA PRODUCING BUDD-CHIARI SYNDROME. (E.) Cardell, B. S. (King's Coll. Hosp., London), D. A. F. McGill and R. Williams. *J. Pathol.* 104(4):283-286, 1971.

A 66-yr-old male presented with a month's history of epigastric pain and edema of the legs. The liver was enlarged and at laparotomy, biopsy revealed hepatic venous occlusion with gross centrilobular congestion and cellular damage. A liver scintiscan showed uptake of a radioactive colloid marker in the central area of the liver only, just below the xiphisternum. Reflux of contrast medium occurred into the inferior vena cava and this outlined a large lobulated filling defect, which encroached upon the inferior aspect of the right atrium. Liver function deteriorated, with a rise in serum bilirubin from 3.4 to 19.7 mg%, and the patient died 1 month after first admission. At necropsy the inferior vena cava was blocked and distended by a bosselated avoid tumor that measured 13 x 7 x 7 cm. The lower and larger portion lay within the wall of the vein with a small area of invasion of the adventitia. There was another intraluminal extension of the upper part of the tumor for 1 cm into the left hepatic vein. The chief ill effects of these tumors result from obstruction of the inferior vena cava and its branches either directly by tumor or more often by superimposed thrombosis.

8769 THE FUNCTIONAL STATE OF THE LIVER IN LEPTOSPIROSIS. (Rus.) Pupkevich Diamant, I. S. *Klin. Med. (Mosk.)* 49(6):114-120, 1971.

8770 THE STATE OF THE LIVER IN PATIENTS WITH DIABETES MELLITUS ACCORDING TO DATA OF SCANNING AND PUNCH BIOPSY). (Rus.) Spesivtseva, V. G., V. I. Zaichikova, M. P. Rubin and V. V. Prokhorov. *Klin. Med. (Mosk.)* 49(6):109-114, 1971.

8771 MANIFEST AND LATENT FORMS OF ACUTE INTERMITTENT HEPATIC PORPHYRIA. (Rus.) Idelson, L. I. and G. P. Koroteeva. *Klin. Med. (Mosk.)* 49(6):96-101, 1971.

8772 ISOLATED NODULAR TUBERCULOSIS OF THE LIVER. CASE REPORT. (It.) Lucioni, F. (L. Galmarini Gen. Hosp., Tradate, Italy) and N. Grizzetti. *Gazz. Int. Med. Chir.* 76(13): 827-832, 1971.

8773 DIAGNOSIS OF EXTRAHEPATIC JAUNDICE IN HODGKIN'S DISEASE. (E.) McNulty, J. G. (St. Thomas's Hosp., London). *Br. Med. J.* 3(5778):26-27, 1971.

8774 STUDIES ON MYOINOSITOL. VII. REMOVAL OF DEPOSITED FATS FROM DIETARY FATTY LIVER. (E.) Nishigaki, I. (U. Nagoya Sch. Med., Japan), S. H. Hasan and A. Kotaki. *J. Vitaminol. (Kyoto)* 17(2):112-116, 1971.

8775 CHRONIC MARIHUANA USAGE AND LIVER FUNCTION. (E.) Hochman, J. S. (UCLA Sch. Med., Los Angeles, Calif.) and N. Q. Brill. *Lancet* 2(7728):818-819, 1971.

8776 CLASSIFICATION OF SUPPURATIVE DISEASES OF THE LIVER. (Rus.) Babaev, O. G. and O. B. Milonov. *Khirurgiia (Mosk.)* 47(7): 58-60, 1971.

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8820 REPORT ON THE ACTION OF SILYMARIN IN LIVER DISEASES. (Ger.) Hammerl, H. (Wilhelminen Hosp., Vienna), O. Pichler and M. Studlar. *Med. Klin.* 66(36):1204-1208, 1971.

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8822 DIGESTIVE HEMORRHAGE WITH PORTAL HYPERTENSION DUE TO INCREASED BLOOD FLOW IN THE LEFT GASTRIC ARTERY. (Fr.) Lamarque, J. L. (Saint Eloi Clin., Montpellier, France), J. F. Ginestie, E. Lopez and J. P. Senac. *Presse Med.* 79(25):1153-1156, 1971.

See also numbers: 8292, 8327, 8328, 8521, 8651, 8996, 8997

8823 NATURAL HISTORY OF ALCOHOLIC HEPATITIS. II. THE LONG-TERM PROGNOSIS. (E.) Alexander, J. F. (Emory U. Sch. Med., Atlanta, Ga.), M. W. Lischner and J. T. Galambos. *Am. J. Gastroenterol.* 56(6):515-525, 1971.

Follow-up information on 164 of 169 patients with alcoholic hepatitis was obtained to determine long term prognosis of the disease. The overall 5-yr survival after liver biopsy was 56.2%, and 62.7% after the onset of illness. The severity of alcoholic hepatitis had no effect on survival after biopsy either when the combination of mild and moderate severity was compared with that of moderate and severe, or when mild was compared with moderate. Neither the presence of alcoholic hyaline nor the severity of steatosis had any effect on survival, but the presence of severe fibrosis decreased the survival rate. Survival rates were lowered in those patients with ascites, but unchanged in patients with encephalopathy or elevated serum bilirubin. Survival rates of patients who had varices, elevated wedged hepatic vein pressure or palpable spleen were not different from those who did not. Abstinence from alcohol, either complete or partial, increased the rate of survival.

8824 CHOLESTATIC JAUNDICE CAUSED BY ORAL OVULATION INHIBITORS. (Ger.) Wiontzek, H. (City Hosp., Geesthacht, Germany). *Z. Gastroenterol.* 9(6):461-464, 1971.

A 29-yr-old woman developed cholestatic jaundice after 4 month's intake of norethisterone acetate + ethynylestradiol. Liver functions returned to normal 3 months after cessation of oral contraceptive intake. However, similar symptoms recurred 1 yr later when the patient was 4 months pregnant.

8825 ULTRASTRUCTURE OF ACUTE TETRACYCLINE INDUCED LIVER CHANGE. (E.) Kamjanov, I. (U. Zagreb Med. Fac., Yugoslavia) and D. Solter. *Experientia* 27(10):1204-1205, 1971.

The acute effects of a single i.p. injection of 250 mg tetracycline/kg body weight on hepatic ultrastructure was studied in female rats. After 30 min, cytoplasmic architecture did not change, except for disappearance of glycogen granules and slight swelling of mitochondria, which reached a maximum at 3 hr and decreased thereafter. At 3 hr, moderate dilation of endoplasmic reticulum and disappearance of ribosomes from the membranes became evident. Liposomes and larger fat droplets without limiting membranes began to accumulate in the cytoplasm. All these changes were more prominent in the centrilobular hepatocytes, this difference becoming more evident by 6 hr. The centrilobular hepatocytes exhibited a marked dilation and vesiculation of endoplasmic reticulum with abundant accumulation of fat droplets. By 6 hr some of the centrilobular cells underwent necrosis, with pyknosis of their nuclei and complete disorganization of the cytoplasmic architecture and disruption of organelles. The Kupffer cells became prominent, their cytoplasm was enlarged and filled with large phagosomes stuffed with cellular detritus. At 12 hr the overall picture was basically unchanged. At 24 hr all cells except the few necrotic ones regained normal appearance. Thus, focal centrilobular necrosis which was sparsely encountered represents the only irreversible change induced by a single large dose of tetracycline.

8826 CONTROVERSIES IN THE MANAGEMENT OF LIVER TRAUMA. (E.) Faris, T. D., F. G. Winegarner and B. Eiseman (Denver Gen. Hosp., Colo.). *J. Trauma* 11(11):915-918, 1971.

The operative management of 57 civilian cases of liver injury and 34 cases of military combat injury are reviewed. The civilian cases were divided into 37 penetrating injuries and 20 blunt injuries. The military injuries consisted of 33 penetrating injuries and 1 blunt injury. Early laparotomy is mandatory for severe injuries when exsanguination is a threat, or for penetrating missile wounds. Simple stab wounds which are not bleeding require simple drainage; hemostasis can be accomplished by suturing. More extensive lacerations require debridement to achieve hemostasis. In blunt injuries there are often cardiac contusion and pulmonary injuries. Central venous pressure and transthoracic pulmonary impedance monitoring and blood gas analysis is necessary in these cases. Hepatic lobectomy, with adequate removal of devitalized tissue, should be avoided because of the high mortality rate. Dissection, when a right hepatic lobectomy is necessary, should leave the middle hepatic vein intact. The use of an internal shunt may save patients with retrohepatic vena cava or hepatic vein wounds. A tube cholecystomy is advised for biliary drainage and concomitant intestinal injuries should be exteriorized, not resected, and closed. Soft rubber drains should be used to remove bile only as long as necessary; infection must be avoided. The complication rate with minor wounds was 65% with 100% survival; with lobectomy the mortality was 64%.

8827 TEMPORARY AUXILIARY LIFE-SUSTAINING LIVER TRANSPLANTATION FOLLOWING ACUTE HEPATIC NECROSIS. (E.) Kuster, G. G. R. (Mayo Clin., Rochester, Minn.) and J. E. Woods. *Surg. Forum* 22:337-339, 1971.

Auxiliary liver transplantations were performed on 20 dogs 36 hr after the injection of a lethal dose of N-nitrosodimethylamine (NDMA; 30 microliters/kg i.v.). The NDMA-damaged livers and portal systems were left intact, so that the graft could be removed 2-6 weeks after transplantation, when the rejection process could no longer be controlled. Immunosuppression was achieved by the administration of azathioprine and methylprednisolone. All control animals receiving NDMA without subsequent transplant died from acute liver necrosis within 6 days, while 16/20 animals receiving liver allografts survived. Three dogs with transplants died within 2 weeks after surgery. Rejection of the transplant occurred within 7-20 days in the remaining animals and, with only 1 exception, the host liver had regenerated sufficiently at that time to sustain life. This procedure provides temporary support for the damaged liver, but avoids complications secondary to rejection and immunosuppressive therapy.

8828 OBSERVATIONS ON LIVER REGENERATION AFTER RIGHT HEPATIC LOBECTOMY. (E.) Blumgart, L. H. (Welsh Natl. Sch. Med., Cardiff), K. G. Leach and S. J. Karran. *Gut* 12(11):922-928, 1971.

One of 5 patients who received right hepatic lobectomy (removal of 50% of liver substance) died 10 hr postoperatively and showed no macroscopic evidence of increase in liver size or weight. Another patient who came to necropsy 10 days after hepatic lobectomy had a large liver with good consistency and shape. The liver had reached its preoperative weight (1.7 kg) within 10 days. Rectilinear liver scans carried out from the fourth day to the ninth month after operation in the 3 surviving patients demonstrated an early increase in liver size during the first 10 days. Little if any further increase in size occurred during the ensuing months. The shape of the regenerating livers was globular, the liver enlarging downwards and to the right to fill the space previously occupied by the right lobe. In other patients the liver also enlarged into the left diaphragmatic space. The direction in which the liver remnant enlarges appears to be in part dependent on pressure factors.

8829 INTRAHEPATIC ARTERIOVENOUS FISTULAS BETWEEN THE HEPATIC ARTERY AND PORTAL VEIN. (E.) Foley, W. J. (U. Michigan Med. Ctr., Ann Arbor), J. G. Turcotte, P. A. Hoskins, R. L. Brant and R. G. Ause. *Ann. Surg.* 174(5):849-855, 1971.

During an 8-yr period, 5 cases of intrahepatic hepatic artery-portal vein fistulas were seen in a teaching hospital. Two had resulted from blunt trauma; 1, and possibly another, was caused by a needle biopsy of the liver; one probably arose spontaneously in a cirrhotic liver. This condition was unsuspected in 4 and was discovered only by abdominal angiography. Angiography revealed 3 of the fistulas to have closed spontaneously. A fourth was corrected surgically with debridement of devitalized liver tissue. The fifth patient died 2 yr after diagnosis, but was not available for further evaluation or autopsy.

8830 TRAUMATIC HEMOBILIA: NON-OPERATIVE MANAGEMENT WITH HEALING DOCUMENTED BY SERIAL ANGIOGRAPHY. (E.) Hendren, W. H. (Massachusetts Gen. Hosp., Boston), A. L. Warshaw, D. J. Fleischli and M. K. Bartlett. *Ann. Surg.* 174(6): 991-993, 1971.

A 5-yr-old boy had traumatic hemobilia hemorrhage into the gastrointestinal tract through the biliary tree after trauma to the liver. Due to a fall, the patient sustained abdominal trauma with laceration of the right lobe of the liver. Later, melena followed by hematemesis occurred along with back pain, epigastric pain and jaundice. Selective common hepatic angiography was performed and a diagnosis of hemobilia was made. It was elected to defer operation and follow the patient's course with serial selective angiograms. After 2 months the angiograms demonstrated that spontaneous healing had taken place. The patient was entirely well for an additional 24 months. Angiographic demonstrations of liver lesions and their healing provide a rational basis for electing and adhering to a nonoperative approach in cases of injury in which there are no episodes of massive bleeding, and the hemorrhage is not-life threatening. Angiography is also valuable in guiding the surgeon if exploration should be required.

8831 CLINICAL AND PATHOHISTOLOGIC STUDIES OF THE LIVER IN MUMPS. (Rum.) Kelemen, L. (Inst. Med. Pharm., Tirgu Mures, Rumania), F. Gyergyay and R. I. Pascu. *Med. Interna (Bucur.)* 23(6):659-666, 1971.

8832 TWO CASES OF HEPATITIS DUE TO CONGENITAL SYPHILIS PROVED BY BIOPSY. (Fr.) Lepercq, G. (Leon Bernard Hosp., Brevannes, France), R. Saada and R. Steinschneider. *Ann. Med. Interne (Paris)* 122(5):633-638, 1971.

8833 THE EFFECT OF PHYSICAL OVERHEATING OF AN ANIMAL ON OXIDATIVE PHOSPHORYLATION IN THE MITOCHONDRIA OF THE LIVER AND SKELETAL MUSCLES AT HIGH TEMPERATURE OF THE INCUBATION MEDIUM AND THE ACTION OF 2,4-DINITROPHENOL. (Rus.) Kazueva, T. V. *Patol. Fiziol. Eksp. Ter.* 15(4):16-19, 1971.

8834 INTRAABDOMINAL INJURIES IN CHILDREN DUE TO FALLING FROM A BICYCLE. (Ger.) Hupfauer, W. (U. Dusseldorf Surg. Clin., Germany). *Paediatr. Prax.* 10(2):231-232, 1971.

8835 RICKETS: A COMMON COMPLICATION OF NEONATAL HEPATITIS. (E.) Yu, J. S.

(U. Sidney Dept. Child Health, Australia), J. A. Walker Smith and E. D. Burnard. *Med. J. Aust.* 1(15):790-792, 1971.

8836 COMPLICATED EVOLUTION OF A TRAUMATIC RUPTURE OF THE LIVER. (Rum.) Ionescu, A. (Ist Hosp Botosani, Rumania) and I. Buhociu. *Chirurgia (Bucur.)* 20(5):451-454, 1971.

8837 DRAINAGE OF THE COMMON BILE DUCT IN LIVER INJURIES. (E.) Wasowski, J. *J. Abdom. Surg.* 13(6):118-120, 1971.

8838 MASSIVE BLUNT INJURY TO THE LIVER. RIGHT HEPATIC LOBECTOMY IN A CASE OF BILOBAR INVOLVEMENT. (E.) Delaney, P. V. (Mater Misericordiae Hosp., Dublin, Ireland), W. P. Hederman and F. X. O'Connell. *J. Ir. Med. Assoc.* 64(411):249-250, 1971.

8839 PRESSURE STABILITY OF THE HUMAN LIVER IN PARTICULAR CONSIDERATION OF TRAFFIC ACCIDENTS. (Ger.) Fazekas, I. G. (U. Szeged Inst. Leg. Med., Hungary), F. Kosa, G. Jobba and E. Meszaros. *Z. Rechtsmed.* 68(4):207-224, 1971.

8840 A CASE OF JAUNDICE CAUSED BY NITROFURANTOIN. (Dut.) Hannon, R. (Acad. Hosp., Leiden, Netherlands) and B. Goslings. *Tijdschr. Geneeskd.* 27(15):751-756, 1971.

8841 IRRADIATION INDUCED LOCAL HEPATITIS. (Sp.) Ortiz Berrocal, J. (Puerta de Hiero Clin., Madrid), J. Otero Luna and F. Arnaiz Bueno. *Rev. Clin. Esp.* 121(5):451-456, 1971.

8842 MORPHOLOGIC CHANGES DEVELOPING IN THE LIVER OF THE SYRIAN HAMSTER DURING EXPERIMENTALLY INDUCED SEPTICEMIC SHOCK. (Pol.) Ciesielski, L. (Med. Acad Ist Surg. Clin., Lodz, Poland). *Pol. Przegl. Chir.* 43(6):851-857, 1971.

8843 HEPATIC TOXICITY OF ANABOLIZING STEROIDS. (It.) Rozman, C. (U. Barcelona Sch. Med., Spain), A. Urbano and H. Galera. *Minerva Med.* 62(51):2605-2611, 1971.

See also numbers: 8079, 8249, 8311

ACUTE VIRAL HEPATITIS

8844 EPIDEMIOLOGY OF VIRUS HEPATITIS. (Ger.) Červenka, J. (Res. Inst. Epidemiol. Microbiol., Bratislava, Czechoslovakia). *Beitr. Hyg. Epidemiol.* 20:1-96, 1971.

A discussion of the etiology, pathology, pathogenesis, epidemiology, sex ratio and therapy of infectious hepatitis and serum hepatitis. No sex relationship was evident; however, a definite morbidity cycle affecting children 0-14 yr of age from September to November was noted. Corticosteroids are prescribed only in special cases of viral hepatitis and gamma globulin is given in doses of 0.02-0.05 mg/kg to patients with serum and infectious hepatitis. Venous gamma globulin was slightly more effective than placental and gamma globulin and aminocaproic acid was synergistic with both agents. (171 references).

8845 A SIMPLE PROCEDURE FOR PREPARATION OF ANTISERUM TO HEPATITIS-ASSOCIATED ANTIGEN BY USE OF IMMUNE TOLERANCE TO SERUM PROTEINS. (E.) Madaliński, K. (State Inst. Hygiene, Warsaw, Poland), K. Krawczyński, A. Sztachelska, H. Swiderska and L. Dobrzyński. *J. Infect. Dis.* 124(5):517-519, 1971.

Guinea pigs received an intracardiac injection of 0.15 ml (containing 5 mg of protein) of a sterile solution of the euglobulin fraction of human serum precipitated by ammonium sulfate which did not contain hepatitis-associated antigen as tested by immunodiffusion on agar gel. Simultaneously they received an i.m. injection of 0.25 ml of a partially purified solution of hepatitis-associated antigen (1 mg protein), emulsified with an equal volume of complete Freund's adjuvant. After 6 weeks, sera were tested for the presence of antibodies to hepatitis-associated antigen by a complement-fixation test and for the presence of antibodies to human serum proteins by immunodiffusion in gel agar and immunoelectrophoresis. Monospecific antisera to hepatitis-associated antigen were pooled and 1 aliquot was labeled with fluorescein isothiocyanate and tested on sections of human liver containing hepatitis-associated antigen, and normal liver, cardiac muscle, thyroid, kidney, skin and stomach. The sera of 16 of 22 guinea pigs formed a strong precipitin line in immunodiffusion in gel agar with serum containing hepatitis-associated antigen, showing a reaction of identity with human antiserum to hepatitis-associated antigen; antibodies against IgG and beta globulins were revealed by immunoelectrophoresis in 4 of these 16 sera. Of 100 human sera (from patients with acute and chronic viral hepatitis), 32 reacted positively with guinea pig antibodies to hepatitis-associated antigen and to reference human antiserum to hepatitis-associated antigen. In the complement fixation tests the 16 guinea pig antisera had titers of 1:4 to 1:64 and none had any anticomplementary activity. With labeled guinea pig antisera there was brilliant fluorescence of intracellular deposits of hepatitis-associated antigen.

8846 VIRAL HEPATITIS, TYPE B (MS-2 STRAIN). PREVENTION WITH SPECIFIC HEPATITIS B IMMUNE SERUM GLOBULIN. (E.) Krugman, S. (550 First Ave., New York, N. Y.), J. P. Giles and J. Hammond. *JAMA* 218(11):1665-1670, 1971.

At a state school where hepatitis had been endemic for the prior 22 yr, 28 children were divided into 4 groups. The first group consisted of 11 susceptible children who received MS-2 serum containing hepatitis B virus; the second, 5 susceptible children who received MS-2 serum followed 4 hr later by an inoculation of standard immune serum globulin at 0.02 ml/pound body weight; the third, 10 susceptible children who received the same dose of MS-2 serum followed 4 hr later by hepatitis B immune serum globulin at 0.02 ml/pound body weight; the fourth, 2 children who received the hepatitis B immune serum globulin followed 24 hr later by an inoculation of MS-2 serum. All 11 in the first group had evidence of infection with hepatitis B after a mean incubation period of 68 days. Of the 10 in the third group, 6 were completely protected against hepatitis, 1 had a transient infection for 6 days followed by the appearance of antibody, and 3 developed classical type B hepatitis after a mean incubation period of 110 days. In all cases a constant viral dose of 0.1 ml of a 1:10 dilution of MS-2 serum was injected.

8847 EXCHANGE TRANSFUSION TREATMENT OF FULMINATING CANINE VIRAL HEPATITIS: THE ROLE OF SPECIFIC ANTIVIRAL ANTIBODY. (E.) Morris, T. Q. (Columbia U. Coll. Physicians Surg., New York, N. Y.), D. J. Gocke, V. Macarol, G. F. Sardi and S. E. Bradley. *Gastroenterology* 61(6): 885-892, 1971.

The effects of exchange transfusion with specific antiviral antibody in the course of infectious canine hepatitis was studied. Of 7 dogs exchanged with antibody-containing donor blood, 5 recovered. Of 6 dogs treated with a single exchange transfusion of donor blood free of neutralizing antibody to the infectious canine hepatitis virus, 5 died with typical laboratory and histological evidence of acute canine hepatitis. Three susceptible dogs were infected and treated only with a single i.v. dose of 5 ml of hyperimmune antiserum to canine hepatitis (an amount calculated to produce a serum antibody titer greater than 1:500). All 3 dogs in this group survived. Serial measurements of the fractional clearance of BSP indicated that specific neutralizing antibody was effective in preventing death only when administered early in the course of the disease, e.g., before BSP clearance was markedly deranged. Early antibody treatment did not prevent development of a clinically severe illness characterized by lethargy and severe anorexia as well as marked elevations in serum enzymes and changes in BSP clearance.

8848 PECULIAR COURSE OF INFECTIOUS HEPATITIS. (Rus.) Brodov, L. E. *Klin. Med. (Mosk.)* 49(7):139-141, 1971.

8849 ACUTE DYSTROPHY OF THE LIVER IN INFECTIOUS HEPATITIS AGAINST THE BACKGROUND OF CHRONIC LIVER DISEASE. (Rus.) Kasianenko, P. I. *Klin. Med. (Mosk.)* 49(7):137-139, 1971.

8850 ENZYME DISTURBANCES IN ACUTE INTESTINAL INFECTIONS AND VIRAL HEPATITIS. (Rus.) Borisova, M. A. *Klin. Med. (Mosk.)* 49(6):120-126, 1971.

8851 THE USE OF PERFUSION THROUGH HETEROLIVER IN THE TREATMENT OF ACUTE HEPATIC INSUFFICIENCY IN SERUM HEPATITIS. (Rus.) Ketiladze, E. S., N. A. Farber and E. A. Paktoris. *Klin. Med. (Mosk.)* 49(6):89-95, 1971.

8852 THE SEQUELAE OF INFECTIOUS HEPATITIS AND THE STATE OF SOME FACTORS OF NONSPECIFIC REACTIVITY OF THE ORGANISM. (Rus.) Andreichin, M. A. *Klin. Med. (Mosk.)* 49(6):31-33, 1971.

8853 ENCEPHALITIS INFECTIOSA VULPIS (HEPATITIS CONTAGIOSA CANIS) IN A BLUEFOX FARM. (Nor.) Kummeneje, K. (Nord Norge State Vet. Lab., Harstad, Norway). *Nord. Vet. Med.* 23(7-8): 352-360, 1971.

8854 THE SIGNIFICANCE OF THE DETERMINATION OF THE GLUTAMATE DEHYDROGENASE IN VIRUS HEPATITIS IN CHILDREN. (It.) Meroni, R. (Maggiore Hosp., Milan, Italy) and L. Pagliano Sassi. *Minerva Pediatr.* 23(11):494-496, 1971.

8855 A STUDY OF INFECTIVE HEPATITIS WITH SPECIAL REFERENCE TO TREATMENT WITH CORTICOSTEROIDS. (E.) Khan, N. (Civil Hosp., Karachi, Pakistan), N. A. Choudhry, A. Master and F. H. Shiva. *Medicus (Karachi)* 42(1):13-20, 1971.

8856 ACUTE ALCOHOLIC HEPATITIS. (Fr.) Cachin, M. (Cochin Hosp., Paris). *J. Med. Chir. Prat.* 142(17):682-690, 1971.

8857 THE HEPATITIS STORY. SEARCH FOR A CAUSE. (E.) Behbehani, A. M. (U. Kansas Med. Ctr., Kansas City). *J. Kans. Med. Soc.* 72(5):227-231 & 236, 1971.

8858 INFECTIOUS HEPATITIS IN DENTISTS. (Ser.) Zivkovic, M. (Stomatol. Clin., Nis, Yugoslavia) and Z. Perosevic. *Zobozdravst. Vestn.* 26(1-3):91-95, 1971.

8859 DIAGNOSTIC AND DIFFERENTIAL DIAGNOSTIC SIGNIFICANCE OF SERUM UROCANINASE IN VIRAL HEPATITIS AND OTHER FORMS OF JAUNDICE. (Rus.) Gabarets, E. P. *Ter. Arkh.* 43(6):58-63, 1971.

8860 RESULTS OF USE OF A NEW TECHNIC FOR DETERMINATION OF AUSTRALIA ANTIGEN (Au-SH). (Sp.) Rigoli, M. H. (Italian Hosp., Buenos Aires, Argentina), E. Heer and G. Welz. *Rev. Asoc. Med. Argent.* 85(3):33-52, 1971.

8861 STUDY OF GLYCEMIA IN PATIENTS WITH INFECTIOUS AND SERUM HEPATITIS. (E.) Fiorillo, A. M. (Sch. Med. Ribeirao Preto, Sao Paulo, Brazil) and J. C. Da Costa. *Rev. Bras. Pesq. Med. Biol.* 4(1-2):27-34, 1971.

8862 HEMATOLOGIC COMPLICATIONS IN VIRUS HEPATITIS: A FATAL CASE OF PANCYTOPENIA WITH ABNORMAL KARYOTYPE. (Fr.) Albahary, C. (St. Denis Cent. Hosp., Paris), J. De Grouchy and C. Turleau. *Presse Med.* 79(23):1055-1058, 1971.

8863 DETECTION OF AUSTRALIA SH ANTIGEN IN URINE. (E.) Tripatzis, I. (Med. Acad. Inst. Hyg., Lubeck, Germany) and H. G. Horst. *Nature (Lond.)* 231(5300):266-267, 1971.

CIRRHOSIS

8864 CLINICAL AND PATHOPHYSIOLOGICAL VALUE OF HEPATIC VEIN CATHETERIZATION IN CIRRHOSIS. (E.) Zeilicoff, R. (Esmeralda 949, Buenos Aires, Argentina), E. Lopez, D. Solari and P. Cepeda. *Acta Gastroenterol. Lat. Am.* 2(3):129-142, 1970.

At a state school where hepatitis had been endemic for the past 22 yr, 28 children were divided into 4 groups. The first group consisted of 11 susceptible children who received MS-2 serum containing hepatitis B virus. All had evidence of hepatitis B infection after a mean incubation period of 68 days. The second group consisted of 5 susceptible children who received MS-2 serum followed 4 hr later by an inoculation of standard immune serum globulin at 0.02 ml/pound body weight. Only 3 developed hepatitis-associated antigens after an average of 48 days, and 2 of these developed abnormal serum bilirubin levels. The third group consisted of 10 susceptible children who received the same dose of MS-2 serum followed 4 hr later by hepatitis B immune serum globulin at 0.02 ml/pound body weight. Six of this group were completely protected against hepatitis, 1 had a transient infection lasting for 6 days, and 3 developed classical type B hepatitis after a mean of 110 days. Group 4 (2 cases) received hepatitis B serum globulin followed 24 hr later by MS-2 serum. There was passive-active immunity, but no hepatitis in 1, and hepatitis developed in the other with an elevated SGOT appearing after 174 days.

8865 SEBACEOUS GLAND SECRETION IN CIRRHOSIS. (E.) Greene, R. S., P. E. Pochi (Boston U. Sch. Med., Mass.) and J. S. Strauss. *Br. J. Dermatol.* 85(3):247-249, 1971.

The mean value of sebaceous gland secretion in a group of 10 hospitalized male patients with cirrhosis of the liver was 2.6 mg Sebum/10 cm^2/3 hr, not significantly different from 2.38 mg obtained in 85 age-matched normal males. No correlation could be established between lower levels of sebum and presence or severity of estrogenic manifestations listed. In fact, diminished hair growth, gynecomastia, and testicular atrophy were more closely related to higher sebum levels. No relationship could be established between amount of sebum and the degree of liver impairment as reflected by liver function tests. Even with an increase in circulating estrogens and a decrease in circulating androgens in patients with cirrhosis, a sufficient level of androgen is maintained to effect a normal amount of sebum.

8866 PROGRESS IN LIVER DISEASE: PHYSIOLOGICAL FACTORS INVOLVED IN THE CAUSATION OF CIRRHOTIC ASCITES. (E.) White, M. H. (U. Arizona Coll. Med., Tucson), C. L. Witte and A. E. Dumont. *Gastroenterology* 61(5):742-751, 1971.

A review of the literature (78 references). As noted by Starling, intrahepatic portal hypertension is accompanied by a high protein content of ascitic fluid and thoracic duct lymph, while extrahepatic portal hypertension is accompanied by a low protein content of these fluids. An increase in flow of thoracic duct lymph (more than 809 liters/day) is characteristic of hepatic cirrhosis in the presence or absence of ascites. Studies after portacaval shunting support the dual origin of ascitic fluid in hepatic cirrhosis. Using calculations made from plasma albumin and globulin levels and hepatic and intestinal lymph, the splanchnic tissue colloid osmotic pressure was found to be markedly reduced in patients with cirrhosis, with or without ascites. The derangement in effective plasma colloid osmotic pressure in the liver and extrahepatic portal bed opposes the excessive splanchnic lymph formation.

8867 A STUDY OF ALBUMIN SYNTHESIS AND SOME BIOCHEMICAL CHANGES IN NUTRITIONAL CIRRHOSIS OF THE LIVER. (E.) Chandrasekharan, N. (U. Malaya Fac. Med., Kuala Lumpur). *Aust. J. Exp. Biol. Med. Sci.* 49(4):383-395, 1971.

In rats with dietary deficiency and alcohol-induced cirrhosis, albumin synthesis was studied in vitro and was correlated with changes in serum proteins, liver proteins and nucleic acids, hepatic proteolytic activity and oxygen consumption. Cirrhotic animal livers were invariably enlarged and weighed significantly more than control livers. The hepatic synthesis of albumin after 2 hr of incubation of liver slices was greater in the cirrhotic animals. The total amount of albumin synthesized by the whole liver was also greater in the cirrhotic animals, mainly because of their larger livers. Hepatic oxygen uptake and proteolytic activity in cirrhotics was significantly higher than the controls. Protein and RNA concentrations per g liver were significantly lower in the cirrhotic animals, but higher in the cirrhotic group when expressed in terms of body weight. Liver DNA per 100 g body weight was higher, while RNA:DNA ratios and percentage of water was lower in the cirrhotic livers. Total serum protein levels were reduced in the cirrhotic animals; the relative percentage of serum albumin was slightly lower in the cirrhotic group. The hypoalbuminemia observed in cirrhosis is unlikely to be due to impaired albumin synthesis.

8868 IMMUNE PATHOLOGIC PHENOMENA IN CHRONIC HEPATITIS. (Ger.) Schumacher, K. (Univ. Med. Clin., Cologne, Germany). *Mat. Med. Nordmark* 23(5-6):156-167, 1971.

8869 CHRONIC ACTIVE HEPATITIS WITH UNUSUAL HISTOLOGIC FEATURES. REPORT OF A CASE. (E.) Passwell, J. (Tel Hashomer Govt. Hosp., Israel), E. Theodor and B. E. Cohen. *J. Pediatr.* 79(1):36-41, 1971.

8870 FIBROSING ALVEOLITIS AND ACTIVE CHRONIC HEPATITIS WITHOUT HYPERGLOBULINAEMIA. (E.) Huddy, R. B. (Manchester Roy. Infirm., England) and A. Ahmed. *Postgrad. Med. J.* 47(548):363-364, 1971.

8871 CARDIAC CHANGES IN CIRRHOSIS OF THE LIVER. (E.) Ramachandra, K. (Madras Med. Coll., India) and P. Chandrasekhar Varma. *Mediscope* 13(11):526-529, 1971.

8872 SPONTANEOUS FRUCTOSURIA IN PATIENTS WITH LIVER CIRRHOSIS. (Rus.) Alperin, P. M., E. N. Kochina and L. A. Zherebtsov. *Klin. Med. (Mosk.)* 49(6):105-109, 1971.

8873 A CASE OF POSTNECROTIC LIVER CIRRHOSIS WITH EOSINOPHILIC LEUKAEMIA. (E.) Shun Mok, Y. (Woo Sok U. Med. Coll. Hosp., Seoul, Korea) and K. Kwang Do. *Far East Med. J.* 7(3):77-79, 1971.

8874 ARTERIOVENOUS FISTULA OF THE LIVER IN LIVER CIRRHOSIS WITH CARCINOMA. (E.) Mincev, M. (I.P. Pavlov Med. Inst., Plovdiv, Bulgaria) and A. Baldzijski. *Folia Med. (Plovdiv)* 13(1):60-63, 1971.

8875 METASTATIC CARCINOMATOUS LIVER CIRRHOSIS. (E.) Amtrup, F. (County Hosp., Holbaek, Denmark). *Dan. Med. Bull.* 18(2):46-48, 1971.

8876 HAEMAGGLUTINATION REACTION IN INDIAN CHILDHOOD CIRRHOSIS INDICATING VIRAL AETIOLOGY. (E.) Ramakumar, L. (Govt. Med. Coll., Patiala, India) and S. M. Gupta. *Arch. Dis. Child.* 46(247):390-392, 1971.

8877 SERUM HAPTOGLOBIN OF CHILDREN WITH HEPATIC CIRRHOSIS. (Rus.) Chistova, L. V., M. M. Alimova and O. V. Usevolodova. *Pediatriia (Mosk.)* 50(5):47-51, 1971.

8878 HEMOLYTIC ANEMIAS OF CIRRHOTIC PATIENTS. (Sp.) Bacardi Noguera, R. (Social Security City Sanit., Barcelona, Spain), J. Garcia Jimenez, J. Rubies Prat and J. Guardia Masso. *Med. Clin. (Barc.)* 56(6):783-789, 1971.

8879 TREATMENT OF CIRRHOSIS OF THE LIVER AND ITS COMPLICATIONS. (Ger.)

Gerlach, U. (Westphalian Wilhelms U. Med. Clin., Munster, Germany). *Urologe* 11(3):98-101, 1971.

8880 NUTRITIONAL CIRRHOSIS IN MAN? (E.) Popper, H. and F. Schaffner. *N. Engl. J. Med.* 285(10):577-578, 1971.

8881 APPRAISAL OF THE DEGREE OF REVERSIBILITY OF EXPERIMENTAL CIRRHOTIC LESIONS BY THE TRIDIMENSIONAL RECONSTRUCTION METHOD. I. (Rum.) Maros, T. (Inst. Med. Pharm., Tirgu Mures, Rumania), L. Lazar, O. Lakatos and E. Balint. *Morfol. Norm. Patol.* 16(4):337-342, 1971.

8882 COMPARATIVE SURVIVAL AND PROGNOSIS FOR TWO SERIES OF HEPATIC CIRRHOSIS PATIENTS COVERING THE YEARS 1947-1955 AND 1959-1967. (It.) Colucci, C. F. (Cardarelli Hosp., Naples, Italy), F. P. De Luca and R. Esposito. *Minerva Med.* 62(36):1841-1857, 1971.

8883 IMMUNOGLOBULIN, ANTIGAMMA FACTOR, ANTINUCLEUS AND ANTILIVER ANTIBODY LEVELS IN 152 CASES OF LIVER CIRRHOSIS. (It.) Bianchini, E. (Hosp. Inst., Cremona, Italy) and G. Zanacchi. *Minerva Med.* 62(33):1715-1730, 1971.

See also number: 8235

GALLBLADDER AND BILIARY TRACT DISEASES

8884 THE CHOLESTATIC SYNDROME - 1971. (E.) Javitt, N. B. (New York Hosp., N. Y.). *Am. J. Med.* 51(5):637-641, 1971.

Factors that determine bile flow should be considered in the evaluation of the pathophysiology of the cholestatic syndrome. Canalicular bile flow is directly related to bile salt excretion. The variety of primary and secondary micelles that can occur when even relatively simple systems of di- and trihydroxy bile salts are used, makes this an entity subject to great variation. Certain drugs may exert their effect on bile flow by physical means rather than through cellular metabolism. Monohydroxy bile salts are synthesized in the liver and by the bacterial flora of the intestines. Variation here also affects canalicular bile flow. Other factors that affect canalicular flow are cortisol and phenobarbital through the nondependent fraction and alkaline phosphatase and 5'-nucleotidases by affecting membrane permeability. Serum 5'-nucleotidase seems to be particularly sensitive in detecting the cholestatic syndrome. Bile flow may also be regulated through the effects of hormones and neuroregulators on the ducts. Secretin and vagal stimulation quantitatively are most effective.

8885 DETERMINANTS OF CHOLESTEROL CHOLELITHIASIS IN MAN AND ANIMALS. (E.) Dam, H. (Polytech. Inst., Copenhagen). *Am. J. Med.* 51(5): 596-613, 1971.

A review with 80 references. Cholesterol gallstones can be produced in hamsters as the only, or almost only, type of gallstone in 80-100% of the animals within 6 or 7 weeks by feeding them a diet with no polyunsaturated fatty acids, and an easily absorbable sugar as the carbohydrate, glucose being the most effective sugar. For optimum development the hamsters hould be young males. The female hamster develops gallstones high in calcium, phosphate, and glycine-conjugated bile acids. Various dietary substitutions affected the production or nonproduction of stones, i.e. with butter fat 60% had cholesterol stones, and with a high linoleic acid content, 4.6% had cholesterol stones. The effects of bile acids, cholestyramine, clofibrate, and various hormones in the prevention of stone production along with variations in diet that produce cholesterol gallstones in mice, rabbits, guinea pigs, and primates are discussed. The precipitation of cholesterol gallstones requires either an excess of cholesterol, or an excess due to lack of bile salts, phospholipids or other components, and can be traced by the use of radioactive carbon. Studies on human volunteers have indicated that a high ratio of bile salts to lipid-soluble phosphorus is associated with lack of stone formation. Various drugs and modifications in diet may change this ratio.

8886 FOREIGN BODY ODDITIS. (E.) Sferco, A. (Natl. Inst. Health, Haedo, Argentina), D. Cantor, M. Casal and E. Machado. *Acta Gastroenterol. Lat. Am.* 2(1):25-27, 1970.

A 58-yr-old woman with a 10-yr history of radiating epigastric pain, unrelieved by a cholecystectomy for a single stone 4 yr previously, underwent a laparotomy. Exploration of the common duct with a probe revealed a slight resistance to its passage, while the flow measurement and residual pressure were in the upper limit of normal. A papillectomy was performed with an uneventful recovery and she had no further symptoms for 2 yr. Biopsy revealed a cavity in the depth of the muscle bundles of the papillae surrounded by an inflammatory granuloma, with several foreign bodies which could not be identified. These larvae-like bodies were filiform in shape and some were coiled or stretched. It is suggested that these could be the larvae of Stronglyloides stercoralis.

8887 STATISTICAL ANALYSIS OF GALLBLADDER SURGERY AND INDICATIONS FOR SAME. (Ger.) Horntrich, J. (Reg. Hosp., Cottbus, Germany) and H. Keuntje. *Zentralbl. Chir.* 96(39): 1345-1358, 1971.

A punch-card, retrospective analysis of 1423 patients undergoing surgery for gallstones between 1966-1969 showed a male:female ratio of 1:4, with prevalence peaking between 30-60 years of age. The mortality rate was 1.12%, with 5 of 16 deaths due to pulmonary embolism and 6 of 16 due to peritonitis. Only 32.4% of the patients came to surgery because of an emergency situation. Multiple stones in a gallbladder still capable of functioning were found in 57%, single stones in 17.5%. In 80%, the common bile duct was unaffected; in 16%, the duct showed stones or papillary stenosis. Postoperative complications were seen in 14.4%, including 123 cases of local, surgical complications and 98 of such secondary complications (mostly in elderly patients) as pneumonia, thrombosis, pulmonary embolism, cardiac insufficiency, and others. Included is a review and discussion of the indications and contraindications for this kind of surgery.

8888 REPEATED DETERMINATIONS OF SERUM ALPHA-AMYLASE AND LIPASE ACTIVITY IN PATIENTS UNDERGOING SURGERY FOR DISORDERS OF THE BILIARY TRACT. (Ger.) Schröder, H. (Friedrich Schiller U. Surg. Clin., Jena, Germany), K. Winnefeld, K. Moritz and D. Beuthner. *Zentralbl. Chir.* 96(42): 1441-1447, 1971.

Preoperative serum α-amylase and/or serum lipase activity was increased beyond normal values in all of 52 patients undergoing surgery for gallstones and related disorders in the absence of any sign of pancreatitis. The median value for lipase was increased to a considerably greater degree, and correlative studies with activators and inhibitors confirmed that the increase was of pancreatic origin. In all cases, a transitory, further increase on the first postoperative day was followed by rapid normalization. No significant correlation was found between the phenomenon and age-group, duration of illness, previous illnesses, or actual demonstration of gallstones. It is suggested that some degree of pancreatic involvement in disorders of the biliary tract may exist.

8889 THE USE OF MEDIUM CHAIN TRIGLYCERIDES IN THE MANAGEMENT OF BILIARY ATRESIA. (E.) Cohen, M. I. (Montefiore Hosp., Bronx, N. Y.) and L. M. Gartner. *J. Pediatr.* 79(2): 379-384, 1971.

8890 CARCINOSARCOMA OF THE GALLBLADDER. (E.) Mehrotra, T. N. (Med. Coll., Allahabad, India), S. C. Gupta and Y. P. Naithani. *J. Pathol.* 104(2):145-148, 1971.

8891 ACUTE CHOLECYSTITIS IN ELDERLY AND SENILE PATIENTS. (Rus.) Antonenkov, G. M., M. P. Beliaev and I. I. Iudin. *Khirurgiia (Mosk.)* 47(7):70-76, 1971.

8892 LOCALIZED TYPE OF GALLBLADDER ADENOMYOMATOSIS. (Ser.) Sabolic, A. (Med. Sch., Zagreb, Yugoslavia), D. Bubanj and B. Ivanisevic. *Lijecn. Vjesn.* 93(1):35-44, 1971.

8893 NONSURGICAL REMOVAL OF RETAINED BILIARY CALCULI. (E.) Magarey, C. J. (Roy. United Hosp., Bath, England). *Lancet* 1(7708): 1044-1046, 1971.

8894 ACUTE DUODENAL OBSTRUCTION BY CALCULI (BOUVERET'S SYNDROME). (Fr.) Wurtz, A., P. Fichou and D. Duthoit. *Lille Chir.* 26(2): 91-96, 1971.

8895 CHANGES IN THE BLOOD SERUM CHOLINESTERASE ACTIVITY IN PATIENTS WITH CHOLECYSTITIS. (Rus.) Podilchak, M. D. *Klin. Khir.* 51(5):66-68, 1971.

8896 PRIMARY SCLEROSING CHOLANGITIS. A CASE REPORT. (E.) Limwongse, K. (Siriraj Hosp., Bangkok, Thailand) and W. Kosakarn. *J. Med. Assoc. Thai.* 54(5):368-371, 1971.

8897 CHOLEDOCHODUODENOSTOMIES AND SPHINCTEROTOMIES IN CASES OF PAPILLOSTENOSIS. (E.) Gyula, S. (U. Debrecen Med. Sch., Debrecen, Hungary). *J. Abdom. Surg.* 13(5):95-98, 1971.

8898 SPONTANEOUS INTERNAL BILIARY FISTULAS. ANATOMIC AND CLINICAL CONSIDERATIONS. (It.) Nuzzo, G. (Sacred Heart U. Inst. Spec. Surg. Pathol., Rome), F. Ceriati and G. Ardito. *Gazz. Int. Med. Chir.* 76(9):565-594, 1971.

8899 EVALUATION OF TREATMENT OF ACUTE CHOLECYSTITIS. (Sp.) Anonymous. *Dia Med.* 43(4):105-106, 1971.

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8901 THE EFFECTS OF TRUNCAL VAGOTOMY ON THE GALLBLADDER. (Por.) Milton Da Silveira, G. (Fed. U. Sch. Med., Baia, Brazil). *Med. Univers. (Lisboa)* 14(3):161-164, 1971.

8902 JAUNDICE AND ABDOMINAL PAIN IN A 65-YEAR-OLD WHITE WOMAN. (E.) Smith, C. (George Washington U. Sch. Med., Washington, D.C.). *Med. Ann. DC* 40(5):320-323, 1971.

8903 CHOLEDOCHAL CYSTS: EXPERIENCE WITH RADICAL EXCISION. (E.) Jones, P. G. (Roy. Child. Hosp., Melbourne, Australia), E. D. Smith, A. M. Clarke and M. Kent. *J. Pediatr. Surg.* 6(2, Pt. 1):112-120, 1971.

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8905 DRAINAGE OF THE COMMON BILE DUCT IN OBSTRUCTIVE JAUNDICE. (Rus.) Ogii, P. E. and V. P. Zakharov. *Khirurgiia (Mosk.)* 47(5):94-97, 1971.

8906 DIAGNOSIS AND TREATMENT OF COMBINED DISEASES OF THE BILE DUCTS AND KIDNEYS. (Rus.) Roman, L. I. and E. L. Khavin. *Khirurgiia (Mosk.)* 47(5):88-93, 1971.

8907 DIAGNOSIS AND SURGICAL TREATMENT OF CANCER OF THE GALLBLADDER. (Rus.) Kochiashvili, V. I. *Khirurgiia (Mosk.)* 47(5):80-84, 1971.

8908 COMBINED OPERATIONS ON THE BILE DUCTS AND STOMACH. (Rus.) Milonov, O. B., E. N. Vantsian, A. A. Movchun and A. F. Chernousov. *Khirurgiia (Mosk.)* 47(5):75-80, 1971.

8909 CANCER OF EXTRAHEPATIC BILE DUCTS. (Rus.) Mamamtavrishvili, D. G. *Khirurgiia (Mosk.)* 47(5):72-74, 1971.

8910 TREATMENT OF BILIARY TRACT DISEASES WITH FELVITAN (ANETHOLE TRITHIONE). (Pol.) Gonciarz, Z. (Med. Acad 3rd. Intern. Dis. Clin., Katowice, Poland). *Pol. Tyg. Lek.* 26(28):1084-1086, 1971.

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8913 ORAL CHOLECYSTOGRAPHY AND INTRAVENOUS CHOLANGIOGRAPHY. (E.) Nikolaidis, D. (Gen. Hosp., Augusta, Maine). *J. Maine Med. Assoc.* 62(8):182-185, 1971.

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8919 REPAIR OF COMMON BILE DUCT INJURY. (E.) Thorbjarnarson, B. (New York Hosp.-Cornell U. Med. Ctr., N. Y.). *Surg. Gynecol. Ogstet.* 133(2):293-296, 1971.

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8921 CHOLECYSTECTOMY FOR ACUTE DISTENTION OF THE GALLBLADDER IN A FIVE-YEAR-OLD CHILD. (Sp.) Gubern Salisachs, L. (Mataro Hosp., Barcelona, Spain), J. Ricoder Clavell and P. L. Gubern. *Rev. Esp. Pediatr.* 27(158):215-218, 1971.

8922 LESS FREQUENT COMPLICATIONS OF CHOLELITHIASIS. (Pol.) Czarnecki, B. (J. Brudzinski Hosp., Lodz, Poland), M. Krynicki and L. Niedzialek. *Pol. Tyg. Lek.* 26(24):913-914, 1971.

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8924 PERFORMANCE OF A BYPASS ANASTOMOSIS IN OBSTRUCTION OF THE COMMON BILE DUCT. (Pol.) Tobik, S. (Med. Acad. 2nd Surg. Clin., Katowice, Poland), A. Dyaczynska and J. Warchala. *Pol. Przegl. Chir.* 43(6):825-827, 1971.

8925 A CASE OF ADENOMA OF THE GALLBLADDER. (Fr.) Davy, A. (Charles Nicolle Hosp., Rouen, France) and J. Lefort. *Ouest Med.* 24(10):1101-1104, 1971.

8926 THE ABNORMAL LIPOPROTEIN OF CHOLESTASIS. (E.) Havel, R. J. *N. Engl. J. Med.* 285(10):578-579, 1971.

8927 THE CONCEPTS OF DYSKINESIA AND DISEASES OF THE EXTRAHEPATIC BILIARY PASSAGES. (Sp.) Moya, M. (Gen. Hosp., Cordoba, Spain). *Medicamenta (Madr.)* 29(485):187-190, 1971.

8928 DIAGNOSIS OF THE CYSTIC STUMP SYNDROME. (Ger.) Zehender, K. (St. Marien Hosp., Lunen, Germany) and E. Goetsch. *Med. Welt* 22(22):923-926, 1971.

8929 GASTROINTESTINAL HEMORRHAGES IN PEDIATRIC PRACTICE. (Rus.) Boyarintsev, V. A., N. I. Tegeriak and L. I. Matovetskaia. *Pediatriia (Mosk.)* 50(4):89-90, 1971.

8930 DIAGNOSIS OF CHRONIC GALLBLADDER DISEASE AND THE PHYSICOCHEMICAL PROPERTIES OF BLADDER BILE. (Pol.) Olszanska, T. (Med. Acad. Ist. Clin. Intern. Dis., Lodz, Poland). *Pol. Arch. Med. Wewn.* 46(5):599-605, 1971.

8931 INCREASED INCIDENCE OF CHOLELITHIASIS FOLLOWING GASTRIC RESECTION? (Ger.) Theisinger, W. (Tech. U. Surg. Clin., Munich, Germany). *Med. Klin.* 66(25):930-933, 1971.

See also number: 8219

8932 THE USE OF MEDIUM-CHAIN TRIGLYCERIDES (MCT) IN GASTROENTEROLOGY. (Fr.) Demole, M. J. (Canton Hosp., Geneva, Switzerland). *Presse Med.* 79(40):1735-1737, 1971. (20 references)

A review of medium-chain triglycerides in clinical practice includes report of relief of postgastrectomy steatorrhea in 4 patients during postoperative hospitalization.

8933 MALIGNANT DISEASE IN DERMATITIS HERPETIFORMIS. (E.) Mansson, T. (U. Lund Dept. Dermatol., Sweden). *Acta Derm. Venereol. (Stockh.)* 51(5):379-382, 1971.

Carcinoma appeared in 5 of 9 patients with dermatitis herpetiformis during an observation period of 3 yr. All 9 patients were sulfone-independent and had been selected for gastrointestinal study because of anemia or their need of unduly large doses of sulfone. More or less severe enteropathy was diagnosed in 7 of 9, including 3 who later developed cancer. The remaining 2 patients were subjected to gastric resection and both had a malignant disease. In about two-thirds of all patients with dermatitis herpetiformis the small intestine had lesions of the same type as that seen in celiac disease. Enteropathy in dermatitis herpetiformis or gastrectomy may increase the risk of malignancy. Since several aromatic amino- and nitroso-compounds have been shown to produce atypical epithelial proliferations and malignant growths, cancer may be induced by diaminodiphenylsulfone or some of its metabolites with greater affinity for DNA.

8934 THE SIGNIFICANCE OF LOW PLATELET ADHESIVENESS IN MASSIVE GASTROINTESTINAL BLEEDING. (E.) Matini, K. (U. Louisville Sch. Med., Ky.) and M. Atik. *Surg. Forum* 22:324-326, 1971.

In 12 patients with massive gastrointestinal bleeding following the stress of trauma in 7 and sepsis in 5, the platelet adhesiveness was markedly reduced to 17 ± 5%, which is significantly lower than the mean of 41 ± 9% for normal individuals. The platelet count was not reduced, except in 4 patients with sepsis. All of the patients continued to bleed, and 8 died. In 4 patients the platelet dysfunction was controlled by transfusions of fresh blood or platelets. One of these patients died of recurrent sepsis, while the other 3 survived. In another group of 8 patients with gastrointestinal bleeding following salicylate intake, there was also a significant reduction in the platelet adhesiveness with a mean of 21 ± 5%, without reduction in platelet count, except in 1 patient who received a transfusion of old blood. Bleeding stopped in all of these patients following transfusion with fresh blood or platelets. In a third group of patients who bled from chronic gastroduodenal ulcers, there was little or no reduction of platelet adhesiveness, with a mean value of 29 ± 4%. Bleeding stopped either spontaneously, or following transfusions of fresh blood.

8935 THE HOURLY RATE OF URINARY AMYLASE EXCRETION, SERUM AMYLASE, AND SERUM LIPASE. PART I. IN CONTROL SUBJECTS AND PATIENTS WITH RENAL DISEASE. (E.) Waller, S. L. (Cent. Middlesex Hosp., London) and A. J. Ralston. *Gut* 12(11):878-883, 1971.

Subjects consisted of 190 controls (patients with medical problems but no history of renal or gastrointestinal disease) and 49 with urinary tract disease or elevated blood urea levels. In a 2-hr urinary collection in controls, the mean rate of excretion of amylase was 18 IU/hr (range of 5-69 IU/hr). The mean serum amylase level was 144 IU/liter with a range of 38-251 IU/liter. The selected upper limit of normal for the serum lipase (at the 97.5% level) was 1.6 U/ml. The hourly rate of urinary amylase excretion did not vary significantly with age, while the mean values for both serum amylase and urinary amylase excretion were significantly lower in women than in men. Compared with controls, patients with chronic renal disease had normal urinary amylase excretion rates in the face of elevated serum levels of amylase and lipase.

8936 PART II. PATIENTS WITH GASTROINTESTINAL AND PANCREATIC DISORDERS. (E.) Waller, S. L. (Cent. Middlesex Hosp., London) and A. J. Ralston. *Gut* 12(11):884-890, 1971.

Subjects consisted of 191 patients with gastrointestinal disorders (38 with hepatobiliary disease, 32 with pancreatic disease, 13 with diabetes, and 110 with general gastrointestinal disorders), none of whom had renal disease. Serum amylase and lipase and 2-hr urinary excretion of amylase were measured and compared with results previously reported in controls. In those with generalized gastrointestinal diseases (ulcers, cancer, bleeding, inflammatory conditions, etc.) the mean hourly urinary amylase excretion (18 IU/hr), the mean serum amylase (154 IU/liter) and the upper normal lipase (2.0 U/ml) did not differ significantly from controls. Of the 38 with hepatobiliary disease, 6 had urinary amylase excretion rates which exceeded the upper limit seen in the gastrointestinal group (88 IU/hour). In the diabetics, the only deviation from control levels was a transient iatrogenic elevation of the urinary amylase excretion seen on initial examination in 2 patients. Of the 10 with chronic pancreatitis, 4 had relapsing attacks, while the remaining 6 had a urinary amylase excretion rate of less than 19 IU/hr. Of 7 with carcinoma of the pancreas, 1 had elevation of all 3 parameters, while a second had elevation of serum amylase and lipase in the face of a normal urinary amylase excretion. Levels were elevated in 8 with acute pancreatitis and in 2 women who developed pseudocysts after an attack of acute pancreatitis. Normal levels were seen in 3 men with known acute relapsing pancreatitis after an episode of pain.

8937 THE ETIOLOGY OF INGUINAL HERNIA. (E.) (E.) Conner, W. T. (U. Arizona Coll. Med., Tucson) and E. E. Peacock, Jr. *Surg. Forum* 22:69-71, 1971.

Inguinal hernias were not produced in rats (36) by surgical enlargement of the inguinal canal alone, by a defective external ring alone or by either in combination with lathyrism. Hernias did occur in 4/20 rats with an internal ring enlarged by a 5-mm transverse incision in the medial wall, as long as the wound persisted. Lathyrism alone induced by injection of β-aminoproprionitrile (0.5 mg/g/day) or ingestion of a diet consisting of 50% sweet pea, produced hernias in 2/32 animals and in 3 additional animals that underwent surgical intervention, but developed hernias on the side opposite the surgery. Almost all animals (18/20) developed inguinal hernias after incision of the internal ring and simultaneous induction of lathyrism. It is suggested that inguinal hernias occurring in humans over the age of 40 might be the result of an anatomical internal ring defect that permits prolapse only after metabolic changes in the transversalis fascia.

8938 SJOGREN'S SYNDROME - NEWER ASPECTS OF RESEARCH, DIAGNOSIS, AND THERAPY. (E.) Cummungs, N. A. (Natl. Inst. Dent. Res., Bethesda, Md.), G. L. Schall, R. Asofsky, L. G. Anderson and N. Talal. *Ann. Intern. Med.* 75(6):937-950, 1971.

Sjögren's syndrome consists of the classic triad of salivary and lacrymal gland involvement (sicca complex) and connective tissue disease, commonly being rheumatoid arthritis (50% of patients) which often precedes the sicca complex. An interaction of genetic, immunological, and viral factors are postulated as causing the disease, which resembles, along with lupus, the genetic disease found in the New Zealand Black (NZB) mouse. Abnormal amounts of IgG, a specific IgG being Antisalivary Duct Antibody, even greater amounts of IgM and rheumatoid factor illustrate the basic immune defect. The lack of Antisalivary Duct Antibody in patients with just the sicca complex (10% in 1 study, 23% another) and the high occurence of malignant lymphoproliferation disease illustrate the overlap between malignancy and autoimmunity and postulate a possible mechanism in oncogenesis. Technetium scan is a highly sensitive diagnostic aid and there is good correlation between the clinical picture, immunofluorescence, salivary flow rates, secretory sialography and lower lip biopsy. Treatment is discussed.

8939 ISOVALERIC AND α-METHYLBUTYRIC ACIDEMIAS INDUCED BY HYPOGLYCIN A: MECHANISM OF JAMAICAN VOMITING SICKNESS. (E.) Tanaka, K. (Massachusetts Gen. Hosp., Boston), K. J. Isselbacher and V. Shih. *Science* 175(4017): 69-71, 1972.

After Sprague-Dawley rats were injected with hypoglycin A, plasma concentrations of methylenecyclopropylacetic acid increased to a maximum (4.8 mg/100 ml) within 4.5 hr and then decreased gradually, with 0.6 mg/100 ml still detected after 24 hr. At 4.5 hr after injection, plasma concentrations of branched-chain pentanoic acids (isovaleric and α-methylbutyric acids) increased 300-fold (from a control of 0.05 to 15.9 mg/100 ml), and reached a maximum (46.5 mg/100 ml) at 24 hr. This latter level was 1.5 times the highest level observed in human isovaleric acidemia. With mass spectrophotometry of methylated specimens taken at 6.5 - 24 hr after injection, it was seen that 55% of the branched-chain pentanoic acids were isovalerate and 45% were α-methylbutyrate; in plasma samples taken at 2.5 hr after injection, only isovalerate was isolated. Plasma concentrations of leucine and isoleucine were unchanged from controls while there were 2- to 3-fold increases in concentrations of lysine histidine, tyrosine, glutamic acid, ornithine and citrulline. In rats given 30% sucrose in drinking water after injection of hypoglycin A, only 2 of 8 showed increased plasma concentrations of isovaleric and α-methylbutyric acid (16 and 21 mg/100 ml, resp.) at 24 hr. Large amounts of N-isovalerylglycine were found in the urine of rats receiving hypoglycin A. It is concluded that the administration of hypoglycin A to rats simulates the isovaleric acidemia seen in Jamaican vomiting sickness.

8940 *IN VITRO* INTESTINAL EXCHANGES OF Na^+, Cl^- ^3H_2O IN EXPERIMENTAL BOVINE NEONATAL ENTERITIS. (E.) Whitten, E. H. and R. W. Phillips (Colorado State U. Dept. Physiol. Biophys., Fort Collins). *Am. J. Dig. Dis.* 16(10): 891-902, 1971.

Changes in the transport of electrolytes and water across ileum, and proximal and distal ansa spiralis in experimental bovine neonatal enteritis was studied *in vitro* using segments of intestine from 4 normal and 4 diarrheic calves. No net losses or gains in Na^+ or K^+ were observed in the mucosal and serosal solutions of the segments of normal intestinal tract, the electrolyte concentrations remaining in balance for all segments used. Segments taken from the diarrheic calves showed mucosal solution gains and serosal losses of 16-20 mEq $Na+$/liter and 0.8 - 1.1 mEq $K+$/liter while Cl^- exchanges were not significantly different from those that occurred in the control calf segments. Tritiated water, which was added only to the serosal solution, moved to the mucosal compartments in the diarrheic calves. Histologically, the ileal segments taken from the diarrheic calves showed shortening and blunting of the villi and a submucosal hyperemia was evident in all segments. There was evidence of sloughed epithelium, seen as plugs in many of the crypts, especially in the segments of proximal and distal ansa spiralis. Thus, Na^+, K^+ and H_2O transport into the intestinal lumen was observed in diarrheic calves.

8941 PRINCIPLES AND PRACTICE OF PARENTERAL NUTRITION. (E.) Dudrick, S. J. (U. Pennsylvania Sch. Med., Philadelphia) and R. L. Ruberg. *Gastroenterology* 61(6):901-910, 1971.

The authors describe the rationale and technique for the now well-established use of parenteral hyperalimentation in patients incapable of eating adequately or at all. This mode of therapy is based on the provision of all nutrients available in i.v. form concentrated in a fluid volume equal to the patient's daily water requirements and infused into a high flow, large caliber central vein at a constant rate over 24 hr to permit maximum utilization and minimum renal excretion. By this means the patient is provided with adequate calories, water, nitrogen, electrolytes and vitamins. Indications for this approach are any alimentary tract disease, nonterminal coma and as adjunctive therapy in malignant disease. The composition of the infusion medium is described in detail for adults and infants and precautions and effective monitoring are discussed. Recent advances include the availability of crystalline amino acids instead of protein hydrolysates.

8942 THE STATE OF THE HEMOSTATIC SYSTEM IN PATIENTS WITH ACUTE DYSENTERY. (Rus.) Zinchenko, V. F. *Klin. Med. (Mosk.)* 49(6):102-105, 1971.

8943 SHIGELLA ASSOCIATED DIARRHOEAL DISEASE IN PRESCHOOL CHILDREN. (E.) Bhat, P. (Christian Med. Coll. Hosp., Vellore Tamil Nadu, India), R. M. Myers and M. Jadhav. *J. Trop. Med. Hyg.* 74(6):128-132, 1971.

8944 WINTER DIARRHOEA IN EGYPTIAN INFANTS AND CHILDREN. (E.) Awad, S. (Ain Shams U. Sch. Med., Cairo, Egypt), S. A. Fattah and Z. Maged. *J. Egypt. Public Health Assoc.* 46(1):16-32, 1971.

8945 METHODS AND TECHNIQUES OF FEEDING OF AGED PATIENTS UNDERGOING DIGESTIVE TRACT SURGERY. (It.) Masera, N. (U. Sestilli Inst. Geriatr., Ancona, Italy) and L. Piazza. *G. Gerontol.* 19(3):166-179, 1971.

8946 DIARRHEA AND CONSTIPATION IN THE AGED. (It.) Fabris, F. (U. Turin Dept. Gerontol., Italy) and A. Robino. *G. Gerontol.* 19(3):200-219, 1971.

8947 TELANGIECTASIAS IN THE GASTROINTESTINAL TRACT IN OSLER'S DISEASE. (Ger.) Walz, A. (City Hosp., Berlin/Moabit, Germany), W. Pribilla and M. Vogel. *Dtsch. Med. Wochenschr.* 96(31):1275-1278, 1971.

8948 EPITHELIOMA OF THE DIGESTIVE TRACT ASSOCIATED WITH CHRONIC LYMPHATIC LEUKEMIA. LOCALIZATION IN THE DIGESTIVE TRACT OF CHRONIC LYMPHATIC LEUKEMIA AND LYMPH NODE LYMPHOSARCOMA. REPORT ON 12 CASES. (Fr.) Bauters, F., J. S. Delmotte and M. Houcke. *Lille Med.* 16(3):393-404, 1971.

8949 SPONTANEOUS PERFORATION OF THE GASTROINTESTINAL TRACT IN THE NEWBORN. (Sp.) Sahmkow, E. (J. M. de Los Rios Hosp., Caracas, Venezuela) and P. A. Perera. *Arch. Venez. Pueric.* 34(1):75-84, 1971.

8950 PUPILLARY REACTION IN CHILDREN WITH RECURRENT ABDOMINAL PAIN. (E.) Apley, J. (United Bristol Hosp., England), D. R. Haslam and C. Grant Tulloh. *Arch. Dis. Child.* 46(247):337-340, 1971.

8951 DIAGNOSIS OF DISEASES ASSOCIATED WITH RECURRENT PAIN IN THE ABDOMEN IN CHILDREN. (Rus.) Nikiforova, N. I. *Pediatriia (Mosk.)* 50(5):51-57, 1971.

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8954 GASTROINTESTINAL MANIFESTATIONS OF DIABETES MELLITUS. (E.) Goyal, R. K. (Yale U. Sch. Med., New Haven, Conn.) and H. M. Spiro. *Med. Clin. North Am.* 55(4):1031-1044, 1971.

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8959 EMERGENCY TREATMENT OF GASTROINTESTINAL BLEEDING. (Jap.) Masunao, O., *Wakayama Igaku (J. Wakayama Med. Soc.)* 22(1):9-15, 1971.

8960 THE EFFECTS OF THE AUGMENTED TRIOLEIN TEST AFTER GASTRECTOMY. (Jap.) Kadomatsu, T. (Toho U., Sch. Med., Tokyo). *Toho Igakkai Zasshi (J. Med. Soc. Toho Univ.)* 18(3): 525-537, 1971.

8961 HUMAN 'YERSINIA ENTEROCOLITICA, INFECTIONS IN 1970. REPORT OF 624 RECENT CASES. CLINICAL AND EPIDEMIOLOGIC ASPECTS. (Fr.) Mollaret, H. H. (Pasteur Inst., Paris). *Pathol. Biol. (Paris)* 19(3-4):189-205, 1971.

8962 PATHOGENICITY OF HEMOLYTIC STRAINS OF E. coli ISOLATED FROM CASES OF INFANTILE ENTEROCOLITIS. (Rum.) Sabau, M. (Inst. Med. Pharm., Tirgu Mures, Rumania), A. Abraham and L. Domokos. *Microbiologica (Bucur.)* 16(2):127-132, 1971.

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8964 MYOSITIS OSSIFICANS OF THE RECTUS MUSCLE AFTER ABDOMINAL SURGERY. (Fr.) Wagenknecht, L. V. *Lyon Chir.* 67(3):227-229, 1971.

8965 EARLY INVESTIGATION OF HAEMATEMESIS AND MELAENA. (E.) Walls, W. D. (Chapel Allerton Hosp., Leeds, England), J. N. Glanville and G. N. Chandler. *Lancet* 2(7721):387-390, 1971.

8966 GASTROCOLIC AND DUODENOCOLIC FISTULAS. AN EXPERIMENTAL STUDY. (E.) Ponka, J. L., A. K. Shaalan and P. C. Pesaros. *Henry Ford Hosp. Med. J.* 19(2):75-82, 1971.

8967 SOME URGENT PROBLEMS OF CARE OF CHRONIC PATIENTS IN THE FIELD OF GASTROENTEROLOGY. (Cz.) Dub, O. (Krajske Hosp., Usti nad Labem, Czechoslovakia) and J. Bitter. *Cesk. Gastroenterol. Vyz.* 25(3):116-125, 1971.

8968 "NONTRAUMATIC" SUBCUTANEOUS RUPTURE OF THE ABDOMINAL WALL. (Rum.) Mersei, F. *Chirurgia (Bucur.)* 20(5):455-458, 1971.

8969 THE CYTOLOGY OF ASCITES. (Ger.) Morawetz, F. (Wilhelmine Hosp., Vienna). *Internist. Prax.* 11(3):375-384, 1971.

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8972 EXTENSIVE IDIOPATHIC RETROPERITONEAL FIBROSIS. (Fr.) Perrin, J. *J. Med. Lyon* 52(1211):975-981, 1971.

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8974 MALIGNANT MESOTHELIOMA. (E.) Venugopal, M. (Mem. Hosp., Charleston, W. Va.), R. L. Leadbetter, B. L. Caldwell and J. Boggs. *W. Va. Med. J.* 67(6):149-152, 1971.

8975 ZOLLINGER ELLISON SYNDROME. (Dan.) Rehfeld, J. F. (Bispebjerg Hosp., Copenhagen) and F. Stadil. *Ugeskr. Laeger* 133(20):979-983, 1971.

8976 SERUM GASTRIN DETERMINATIONS IN THE DIAGNOSIS OF ZOLLINGER ELLISON SYNDROME. (Dan.) Stadil, F. (Natl. Hosp., Copenhagen) and J. F. Rehfeld. *Ugeskr. Laeger* 133(20):983-986, 1971.

GENERAL

8977 STUDY OF VISCERAL DISTURBANCES (INTESTINAL AND RENAL) ACCOMPANYING CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER. (Rum.) Dancau, G., P. Prodan and C. Sgavirdea. *Timisoara Med.* 16(1):63-74, 1971.

8978 BACTERIOLOGIC CLEARANCE IN ADULTS WITH ACUTE DYSENTERY. (Rus.) Tarasov, V. I. *Sov. Med.* 34(6):49-53, 1971.

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8981 SPONTANEOUS PERFORATIONS AND NONTRAUMATIC RUPTURES OF ABDOMINAL ORGANS. (E.) Farooki, M. A. (King Edward Med. Coll., Lahore, Pakistan). *Pak. Med. Forum* 6(3):37-50, 1971.

8982 'ACUTE ABDOMEN' IN CHILDHOOD. (Sw.) Von Hedenberg, C. (Karolinska Hosp., Stockholm). *Opusc. Med. (Stockh.)* 16(4):140-145, 1971.

8983 PATHOGENESIS OF ESCHERICHIA COLI DIARRHEA. (E.) Dupont, H. L. (U. Maryland Sch. Med., Baltimore), S. B. Formal and R. B. Hornick. *N. Engl. J. Med.* 285(1):1-9, 1971.

8984 GRAM NEGATIVE SYSTEMIC BACTERAEMIA IN ALIMENTARY TRACT SURGERY. (E.) Burton, R. C. (Roy. Melbourne Hosp., Australia). *Med. J. Aust.* 1(21):1114-1115, 1971.

See also number: 8310

PARASITOLOGY

8985 THE ANGIOGRAPHIC DIAGNOSIS OF ECHINOCOCCOSIS OF THE LIVER AND SPLEEN. (E.) Garti, I. (Beilinson Hosp., Petach Tikva, Israel) and V. Deutsch. *Clin. Radiol.* 22:466-471, 1971.

Sixteen of 22 cases examined were biologically active cysts and 6 were inactive. In the active expansive stage, as in all benign expanding lesions, the large and medium-sized hepatic and splenic arteries and the intrahepatic portal vein branches showed stretching, elongation and displacement. In the arterial, capillary and portovenous capillary phases, the cyst caused a filling defect. Concomitantly a 2-3-mm-wide dense halo like-staining appeared around the cysts both in the liver and the spleen. In the 6 cases with biologically inactive cysts, 4 were completely calcified dead cysts. In 2 of 22 cases, the hydatid ruptured into the biliary ducts; one of these was also infected but selective celiac angiography showed a regular halo sign. Angiography provides the surgeon with important information on the true size, number and localization of the cysts, the state of the surrounding parenchyma and the course of the blood vessels in the area.

8986 *Hymenolepis diminuta*: THE MICROBIAL FAUNA, NUTRITIONAL GRADIENTS, AND PHYSICOCHEMICAL CHARACTERISTICS OF THE SMALL INTESTINE OF UNINFECTED AND PARASITIZED RATS. (E.) Mettrick, D. F. (U. Toronto Dept. Zool., Ontario, Canada). *Can. J. Physiol. Pharmacol.* 49(11):972-984, 1971.

Trichloroacetic acid-soluble and -insoluble carbohydrate declined steadily from duodenum to ileum in the small intestine of uninfected rats. Infection with ten 16-day-old *Hymenolepis diminuta* reversed the above gradients, and there was a 110% increase in glucose and a 54% increase in trichloroacetic acid-soluble carbohydrate present in the luminal contents. The small intestine of infected rats contained considerably lesser amounts of trichloracetic acid-soluble and -insoluble nitrogen and total lipid, due probably to utilization by the worms of these nutrients. The molar ratios of individual amino acids were significantly altered by the presence of the worms in every region of the intestine. Intestinal pH of parasitized rats was lower than that in uninfected rats, and the pH gradient showed an inverse correlation with worm biomass and lactic acid distribution. Small intestinal and colonic micro-organisms were cut to half in the parasitized rats, *Escherichia coli* and the coliforms showing the greatest decrease in number. Anaerobic enteroccocci and yeasts were absent in the parasitized animals and anaerobic streptococci and micrococci were restricted to the ileum.

8987 COLON PERFORATION IN AMEBIASIS. (E.) Chen, W.-J. (Natl. Taiwan U. Coll. Med., Taipei), K.-M. Chen and M. Lin. *Arch. Surg.* 103(6):676-680, 1971.

Eight of 130 cases of patients hospitalized with amebiasis were complicated by perforation of the colon. Diagnosis of such a condition is difficult and misleading; the most common diagnoses were peritonitis of unknown origin and intestinal obstruction. Clinical pictures of this complication simulate acute abdominal conditions of other causes because of abdominal pain, muscle spasm, and decreased intestinal activity. Sites of perforation in these cases were most commonly seen at the cecum and sigmoid. Three of 8 patients were younger than 5 yr, and 1 was older than 70 yr. Three patients had liver abscesses of amebic origin. Multiple perforation in amebiasis, important in differentiating it from other causes of perforation, was seen in 6 of 8 patients. Prognosis in cases of amebiasis, normally good, is grave when complicated by colon perforation, there being an 87.5% mortality in this study.

8988 THE EFFECTS OF IRON DEFICIENCY, PROTEIN DEFICIENCY AND WORM INFESTATION UPON DISACCHARIDASE ACTIVITY IN THE RAT. (E.) Bolin, T. D. (U. New South Wales Sch. Med., Sydney, Australia), A. McKern and A. E. Davis. *Aust. NZ J. Med.* 1(3):218-223, 1971.

Animals infected with Nippostrongylus brasiliensis had considerably depressed lactase and maltase activities; sucrase was depressed to a lesser extent. Iron deficiency anemia was associated with significant depression of jejunal and ileal lactase activity, but did not affect sucrase and maltase markedly. Jejunal lactase activity was lower in rats on a protein-deficient diet than in controls. Combined protein and iron deficiency had a similar effect on lactase activity to that seen with protein deficiency alone, and again prevented adaptation of intestinal lactase. There was no difference in mucosal protein concentration (expressed on a wet weight basis) between any of the groups. In N. brasiliensis infestation, the nematode was found in large numbers in the jejunum and upper ileum and the mucosa contained multiple punctuate hemorrhagic areas. Microscopic changes included: shortened villi and infiltration of round cells in the lamina propria. Chantes occasionally resembled partial villous atrophy, and most damage occurred at the villous tips. Intestinal lactase was depressed by a number of environmental factors and adaptation of lactase thereby prevented.

8989 STATE OF INTRACAVITY AND PARIETAL DIGESTION IN CHRONIC CHOLECYSTITIS AND LAMBLIASIS OF THE INTESTINE IN CHILDREN. (Rus.) Vorozhtsova, N. I. and G. I. Batanina. *Pediatriia (Mosk.)* 50(5):40-44, 1971.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC,μC	milli-,microcurie(s)
mg	milligram(s)

min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
NAD	nicotanamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotide phosphate
NADPH	reduced nicotinamide adenine dinucleotide phosphate
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

9000 MORPHOLOGIC CHARACTERISTICS OF BILE DUCTS IN MAN IN DIFFERENT PERIODS OF LIFE. (Pol.) Stelmasiak, M. (Med. Acad. Inst. Human Anat., Lublin, Poland) and J. Ošemlak. *Folia Morphol. (Warsz.)* 30(3):343-354, 1971.

The bile ducts of 100 hepato-pancreato-duodenal block specimens, prepared by injection with plastics, polymerization and subsequent digestion with 30% HCl, were analyzed according to 6 age groups (fetuses, neonates, infants, young children, older children and adults). There were significant age-related differences in the dimensions and course of the ducts. The type of connection between the hepatic ducts, the site of origin of the cystic duct, the angle of origin of the cystic duct from the common hepatic duct, the course of the cystic duct, the shape of the gallbladder, and the position of the bottom of the gallbladder in relation to lower margin of the liver were all related to age. In fetuses the lengths and diameters of the common bile, common hepatic and cystic ducts are approximately the same, and in adults the common bile duct has the largest dimensions.

9001 FINE STRUCTURE OF SINUSOIDS AND PORTAL CAPILLARIES IN THE LIVER OF THE ADULT SHEEP AND THE NEWBORN LAMB. (E.) Gemmell, R. T. (Ian Clunies Ross Anim. Res. Lab., Prospect, New South Wales, Australia) and T. Heath. *Anat. Rec.* 172(1):57-70, 1972.

In adult sheep liver numerous gaps and fenestrae exist in the endothelial lining of the sinusoids. A basal lamina completely surrounds each of the sinusoids and separates the plasma compartment from the space of Disse, which is interrupted by occasional perisinusoidal cells, bundles of collagen, and by numerous microvilli of the hepatic cells. Regions of overlap between endothelial cells and junctions between adjacent endothelial cells appeared to be more common in lambs. Although marked variations in the width of endothelial cells occur, thin attenuated segments occur less frequently than in the adult. Sinusoids in lambs are not surrounded by complete basal laminae although small portions of a discontinuous basal lamina do occur. The number of microvilli of hepatic cells is less in young lambs. Portal capillaries, which appear similar in newborn and adult sheep, do differ in structure depending on their size. Fenestrae do not appear in the larger capillaries, and in contrast to the smaller vessels these capillaries have a wider endothelial lining with more frequent intercellular junctions. The lumen of some capillaries is partially or completely occluded by projections from the nuclear region or cytoplasm of the endothelial cells.

9002 SEGMENTAL VENOUS DRAINAGE OF THE CANINE PANCREAS. (E.) Kim, J. P. (Boston City Hosp., Mass.) and J. J. Byrne. *J. Surg. Res.* 11(11):559-562, 1971.

The head and uncinate process drained into the pancreaticoduodenal vein which joined the portal vein, while the body and tail drained into the splenic vein by 1 or 2 pancreatic veins. The venous flow from the splenic vein was not affected by occlusion of the superior pancreaticoduodenal vein, and the flow from the inferior pancreaticoduodenal vein was not changed by occluding the splenic vein. Methylene blue injected into the splenic vein occluded near the junction with the superior mesenternic vein stained the body and tail and never reached the head and uncinate process. Similarly, acid fuchsin injected into the occluded pancreaticoduodenal system stained the head and uncinate process and never reached the body and tail. Venograms did not reveal any significant connection between the 2 pancreatic portions in any of the animals.

9003 IMMUNOFLUORESCENT LOCALIZATION OF SECRETIN AND ENTEROGLUCAGON IN HUMAN INTESTINAL MUCOSA. (E.) Polak, J. M., M. Polak, I. Coulling, S. Bloom and A. G. E. Pearse (Hammersmith Hosp., London). *Scand. J. Gastroenterol.* 6(8):739-744, 1971.

An indirect immunofluorescent technique using anti-pure porcine secretin and anti-pure porcine pancreatic glucagon was utilized to demonstrate the presence and distribution of enteroglucagon and secretin cells in the human fetal and adult intestinal tract. Enteroglucagon cells were found in the terminal ileum of adults and in the terminal jejunum and in the ileum of the fetus. In the adult intestine, enteroglucagon cells were situated predominantly in the upper portions of the crypts and in the villous epithelium, while in the fetus they were found in the glands. Secretin cells were present only in the mucosa obtained from the duodenum and first portion of the jejunum of normal adults, and none were found in the fetal mucosa. Secretin cells were especially numerous in the duodenal mucosa of patients with duodenal or gastric ulceration (showing weak fluorescence) and were also present in the first part of the jejunum (where they showed strong specific fluoresence). Thus, secretin cells appear to be located primarily in the proximal small intestine while enteroglucagon cells are found in the distal portion.

9004 STUDY OF THE INTRAMURAL NERVOUS APPARATUS OF THE SMALL INTESTINE BY TECHNIQUES OF HISTOCHEMICAL IDENTIFICATION OF ACETYLCHOLINESTERASE AND MONOAMINOXIDASE. (Sp.) Gonzalez Lobo, J. M. (Milit. Hosp., Logrono, Spain). *Med. Cir. Guerra* 33(5):31-48, 1971.

9005 THE ZYMOGEN CELLS OF THE DIGESTIVE TRACT. A SUCCINCT REVIEW ABOUT TWENTY YEARS INVESTIGATION IN CELL BIOLOGY. (Fr.) Costesec, A. A. (Bichat Hosp., Paris). *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):185-192, 1971.

9006 SIZE, LIPID AND ENZYME CONTENT OF ISOLATED HUMAN ADIPOCYTES IN RELATION TO NUTRITIONAL STATE. (E.) Englhardt, A. (Univ. 2nd Med. Clin., Dusseldorf, Germany), F. A. Gries, H. Liebermeister and K. Jahnke. *Diabetologia* 7(2):51-58, 1971.

9007 THE FORMATION OF THE ASCENDING COLON. (E.) Fitzgerald, M. J. T. (Univ. Coll. Dept. Anat., Galway, Ireland), J. P. Nolan and M. N. O'Neill. *Ir. J. Med. Sci.* 140(6):258-262, 1971.

9008 THE VASCULAR PATTERN OF HUMAN GASTRIC MUCOSA. (E.) Pace, J. L. (Roy. U. Malta Dept. Anat.). *R.C. Rom. Gastroenterol.* 3(1):9-13, 1971.

9009 QUANTITATIVE DISTRIBUTION OF VITAMIN A IN KUPFFER CELL AND HEPATOCYTE POPULATIONS OF RAT LIVER. (E.) Linder, M. C. (Massachusetts Inst. Technol., Cambridge), G. H. Anderson and I. M. Ascarelli. *J. Biol. Chem.* 246(17):5538-5540, 1971.

9010 STRUCTURE OF LIVER RIBOSOMES STUDIED BY NEGATIVE STAINING. (E.) Nonomura, Y. (Rockefeller U., New York, N. Y.), G. Blobel and D. Sabatini. *J. Mol. Biol.* 60(2):303-323, 1971.

9011 SURGICAL SIGNIFICANCE OF ANATOMIC VARIATIONS OF THE HEPATIC ARTERY. (E.) Suzuki, T. (U. Med. Sch., Kyoto, Japan), A. Nakayasu and K. Kawabe. *Am. J. Surg.* 122(4): 505-512, 1971.

9012 EFFECT OF SUPPLEMENTARY ZINC ON THE INTRACELLULAR DISTRIBUTION OF HEPATIC COPPER IN RATS. (E.) Whanger, P. D. (Oregon State U. Dept. Agric. Chem., Corvallis) and P. H. Weswig. *J. Nutr.* 101(8):1093-1098, 1971.

9013 ENDOCRINE CELLS OF THE DIGESTIVE MUCOSA. (Fr.) Lefranc, G. (Sch. Med., Nantes, France) and G. Pradal. *C.R. Assoc. Anat.* 150(1-160) 1971.

9014 VAGOTOMY AND INNERVATION OF THE COMMON BILE DUCT. I. THE VASCULAR AND NERVOUS PATHWAYS SUPPLYING THE SUPRADUODENAL SEGMENT OF THE COMMON BILE DUCT. (Ger.) Loeweneck, H. (U. Munich Inst. Anat., Germany). *Chirurg* 42(4):178-180, 1971.

9015 HISTOCHEMICAL STUDY OF SOME LYSOSOMAL HYDROLASES OF THE INTESTINAL EPITHELIUM DURING THE DEVELOPMENT OF THE TADPOLE OF DISCOGLOSSUS PICTUS OTTH, ANURAN AMPHIBIAN. I. OBSERVATION WITH THE LIGHT MICROSCOPE. (Fr.) Hourdry, J. (Sch. Sci., Orsay, France). *Histochemie* 26(2):126-141, 1971.

9016 HISTOCHEMICAL STUDY OF SOME LYSOSOMAL HYDROLASES OF THE INTESTINAL EPITHELIUM DURING THE DEVELOPMENT OF THE TADPOLE OF DISCOGLOSSUS PICTUS OTTH, ANURAN AMPHIBIAN. II. OBSERVATION WITH THE ELECTRON MICROSCOPE. (Fr.) Hourdry, J. (Sch. Sci., Orsay, France). *Histochemie* 26(2):142-159, 1971.

9017 A MODIFIED STAIN FOR THE HEPATIC FAT STORING CELL. (E.) Watari, N. (City U. Med. Sch., Nagoya, Japan). *Nagoya Med. J.* 16(4):219-224, 1971.

9018 EXPERIMENTAL BILIOLYMPHATIC REFLUX UNDER BASAL CONDITIONS. (It.) Bertetti, C. (U. Parma Inst. Norm. Human Anat., Italy) and A. Quiroli. *Ateneo Parmense* 42(1):7-8, 1971.

9019 RECEPTOR INNERVATION OF THE SMALL INTESTINE IN NEWBORN INFANTS. (Rus.) Turdiev, K. T. (Pavlov Inst. Physiol., Samarkand, USSR). *Arkh. Anat. Gistol. Embriol.* 60(7):102-106, 1971.

9020 AGE VARIATIONS OF THE NUCLEAR VOLUMES AND DNA CONTENTS IN THE DEVELOPING HUMAN HEPATOCYTES. (E.) Guimaraes, R. C. (Fed. U. Sch. Med., Minas Gerais, Brazil). *Biol. Neonate (Basel)* 18(5-6):407-417, 1971.

See also numbers: 9028, 9053, 9135

9021 SITE OF PHOSPHORUS ABSORPTION FROM THE INTESTINE OF THE MOUSE. (E.) Schryver, H. F. (Cornell U. Dept. Anim. Sci., Ithaca, N. Y.), H. F. Hintz, P. H. Craig, D. E. Hogue and J. E. Lowe. *J. Nutr.* 102(1):143-148, 1972.

There was little difference in the recovery of ^{32}P in urine and feces of fistulated ponies after gastric or cecal administration of the isotope. Sixty percent was eliminated in the feces, less than 1% was in the urine and the unrecovered 40% of the dose of ^{32}P was presumably absorbed, suggesting that phosphorus is absorbed from the large intestine of the horse and that passage of inorganic phosphate through the small intestine is unnecessary for absorption. Using the Cr_2O_3 (unabsorbable marker) technique, a net flow of phosphorus was observed going into the first half of the small intestine and a net removal was seen in the second half. There was a large flux into the cecum and net absorption from the dorsal colon and from the small colon. Although the direction or site of flux was not related to diet, the magnitude was diet-related in several regions of the bowel. The major sites of net phosphorus absorption from all feed sources (high corn, alfalfa) were the dorsal large colon and the small colon. Calcium content of the ration did not affect site of absorption.

9022 SELECTIVE ABSORPTION OF MACROMOLECULES INTO INTESTINAL EPITHELIUM AND BLOOD OF NEONATAL MICE. (E.) Lecce, J. G. (North Carolina State U. Anim. Sci. Dept., Raleigh). *J. Nutr.* 102(1):69-76, 1972.

Newborn mice were capable of absorbing into their blood stream gamma-globulins from a variety of species, after a 4% protein solution gavage. No albumins were absorbed and selectivity of absorption favoring gamma globulins did not vary over the neonatal period (1-12 days of age) tested. Gamma-globulins were not absorbed in 21-day-old mice. In contrast to the vascular system, the intestinal epithelium was nonselective in that a wide variety of albumins were absorbed in the intestinal epithelium; this phenomenon was specific for the neonatal period. Inhibition of reticuloendothelium by injecting 1- and 5- day-old mice with colloidal carbon did not change the selectivity pattern of mice gavaged 24 hr later. Again, egg albumin was excluded from the blood and gamma globulin was not. Mammalian neonates were apparently similar in that they nonselectively absorb, by pinocytosis, macromolecules into intestinal epithelium but differ with respect to the macromolecules found in the blood.

9023 REGIONAL DIFFERENCES IN RATES OF INSORPTION OF SODIUM AND WATER FROM THE HUMAN LARGE INTESTINE. (E.) Devroede, G. J. (Mayo Clin., Rochester, Minn.), S. F. Phillips, C. F. Code and J. F. Lind. *Can. J. Physiol.* 49(12):1023-1029, 1971.

For the 36-min test period, average insorption (rate of unidirectional flux from colonic lumen to blood) rates of both deuterium oxide and ^{24}Na were greater in the proximal part of the human colon. The decline in these rates from the cecum to the transverse colon, left colon, and rectum was progressive and more marked for ^{24}Na. Insorption rates generally decreased with time; sodium insorption decreased from cecum to rectum during both 0-18 min and 18-36 min experimental periods. By contrast, a regional gradient was found for water insorption only during the first 18-min period. The ratio of sodium to water insorption was approximately constant in the cecum (not other sites) with the passage of time in each individual, although the relationship varied between subjects. A linear correlation was found between net absorption and insorption of sodium; the correlation with water was less. A regional gradient of net absorption may exist in the large intestine, analogous to the observed insorption gradient.

9024 UPTAKE OF MICELLAR LIPIDS BY SMALL INTESTINAL SEGMENTS UNDER DIFFERENT EXPERIMENTAL CONDITIONS. (E.) Sylvén, C. (U. Lund Chem. Ctr., Sweden). *Acta Physiol. Scand.* 83(3):289-299, 1971.

Radioactive cholesterol, sitosterol and monoolein uptake from micellar solutions was studied in rat small intestinal segments both with and without blood supply, and in inverted segments in vitro. Varying the Na^+/K^+ ratio of the micellar test solution had no effect on the uptake of any of the lipids studied. Irreversible damage to the uptake process was caused by the absence of blood supply. Maximal uptake of both sterols was found at 37° C. Elevation of the temperature to 41° C or lowering to 25° C resulted in a lowered uptake for both sterols with a Q10 of 3, suggesting a metabolic process. Three states of sterol uptake were observed: high cholesterol and sitosterol, low cholesterol and sitosterol, and a low uptake of sitosterol and high uptake of cholesterol. The latter type corresponds to normal uptake in vivo. Exclusion of blood supply, extensive hypothermic treatment, hypothermia followed by rewarming to 37° C, and biliary drainage followed by uptake experiments of sodium taurocholate and taurodeoxycholate, all produced the above states.

9025 RATES OF NET ABSORPTION OF FAT WHEN FED ALONE OR WITH ESSENTIAL NUTRIENTS. (E.) Trout, D. L. (US Dept. Agric. Res. Serv., Beltsville, Md.) and E. S. Conway. *Proc. Soc. Exp. Biol. Med.* 138(2):556-561, 1971.

Following a test meal of olive oil (100% fat diet), the net rate of fat absorption in rats **was**

3.9 g/124 hr/250 g rat. When WR-1339 (formerly Triton inhibits triglyceride removal from blood) at a dose of 800 mg/kg was injected i.v. into rats similarly fed olive oil, fatty acids accumulated in the plasma at a similar rate. These rates were 50% lower than that found among fasted rats fed a high-fat diet containing hydrogenated vegetable oil (67%), lactallrumin, and vitamin mix in glucose. The rates were 30% lower than observed during prolonged (22 days) ad libitum consumption of the high fat diet. When fat is fed as the main component of a nutritionally complete diet and is consumed in large amounts, animals reach within the first day a rate of fat absorption exceeding that required for rapid growth during ad libitum consumption of a high-fat diet.

9026 EFFECT OF DIFFERENT GASEOUS MEDIA ON THE ACTIVE TRANSPORT OF GLUCOSE IN THE SMALL INTESTINE OF RATS.

(Rus.) Babkina, O. I. and K. V. Smirnov. *Kosm. Biol. Med. (Mosk.)* 5(5): 22-26, 1971.

Hypoxia (a simulated rise with a decompression velocity of 2 m/sec to an altitude of 12,000 m, a stay at this altitude for 15 min, followed by a descent for 30-40 sec), hypercapnia (a stay in 20% CO_2 and 21% O_2 for 12 hr) and hyperoxia (a stay in a barochamber with 100% O_2 at 4 atmospheres for 1 hr) affected the resorptive function of the digestive tract in male albino rats (180-200 g). The initial content of glucose in the serosal and mucosal solutions was 200 mg%. The active transport of glucose was stimulated in all of 6 segments of the small intestine, resulting in an increase in glucose concentration in the serosal fluid. In the first period of incubation (0-30 min), active transport of glucose was highest during hypoxia in all segments except the fourth, and in Period II (30-60 min) in hyperoxia in the first 2 segments, while in hyperoxia, active transport of glucose was increased in the distal segments during periods I and II. In Period III (60-90 min), a maximum active transport of glucose was found in hypoxia in segments 2, 3 and 6, and in hyperoxia in segments 1, 4 and 5. The greatest increase in the amount of transported glucose versus concentration gradient in the whole small intestine was found in Period I, while the amount of glucose transported was similar in hypoxia and hyperoxia in Periods I and II. A decrease in the intestinal transport function was found in hypercapnea during Period III. The greatest increase in active transport was found in hypoxia during all 3 periods, and the least, in hypercapnea during Period III.

9027 DISACCHARIDASE ACTIVITY AND CARBOHYDRATE ABSORPTION AFTER INTESTINAL RESECTION.

(E.) Bury, K. D. (Rhode Island Hosp., Providence). *Surg. Forum* 22:367-369, 1971.

Following 80% proximal or distal small bowel resection, rats were fed a standard rat chow or a chemically defined, high-glucose, sucrose or maltose diet. After 12 weeks, increased villous, height was observed in all animals in both the proximal and distal remnants. There were significant increases in the sucrase and maltase levels of animals on the maltose diets, but no enzyme changes were observed in animals on the sucrose diets. No changes of maltase, sucrase or lactase levels were observed in the resected animals on the rat chow diet. Carbohydrate absorption increased progressively after resection, regardless of diet and disaccharide hydrolysis always exceeded absorption. No correlation was found between disaccharidase activity, hydrolysis and absorption of disaccharides. Since control values for maltose absorption were almost double that for glucose and even further increases were observed after resection, maltose should be further considered as a dietary energy source after massive resection.

9028 INTESTINAL ABSORPTION OF LIPIDS: ULTRASTRUCTURAL ASPECTS OF THE PASSAGE OF CHAINS OF FATTY ACIDS FROM THE INTESTINAL LUMEN INTO THE ABSORBING CELL.

(Fr.) Vodovar, N. (Natl. Inst. Agric. Res., Jouy-en-Josas, France) and J. Flanzy. *C. R. Acad. Sci.* [*D*] *(Paris)* 272(12):1694-1696, 1971.

An electron microscopic study of ultrafine slices of mucosa from the proximal part of the small intestine of young pigs and rats, on whose surface ingested lipids had been preserved and had penetrate to the microvilli, showed that the lipid particles changed shape when they came into contact with the plasma membrane of the absorbing cells. This appeared to permit the dissociation of chains of fatty acids from the substances with which they had been previously associated, at the same time that the external layer of the plasma membrane (which was formed of multiple filaments, separated by fine, non-opaque spaces) appeared to develop pores which opened to the intermediate layer, thus facilitating ingestion of the fatty acid chains.

9029 FLUID AND SOLUTE TRANSIT THROUGH THE MUCOSA AT VARIOUS SEGMENTS OF THE INTESTINES IN THE RABBIT.

(Ger.) Vogel, G. (Madaus Biol. Inst., Cologne, Germany), I. Stoeckert and E. Meyering. *Pfluegers Arch.* 325(3):247-261, 1971.

The duodenal mucosa of the rabbit secretes, at a rate of 59.3 $\mu l/hr/cm^2$, a blood isotonic fluid which is characterized by a high concentration of HCO_3 (almost 100 mM/l) a concentration of Na = 147 mM/l, Cl^- = 42.3 mM/l. Instillation of a solution similar in composition to this duodenal secretion is followed in the jejunum by an isotonic absorption with only a slight change in concentration of solutes. The ileum reacts similarly but the absorption rates for water and solutes are greater. The colon responds with secretion (enterosorption) of fluid resulting in a significant decrease in concentration of the solutes. Instillation of isotonic NaCl solution is followed in the jejunum by fluid absorption whereby Na$^+$ and Cl$^-$ are absorbed and HCO$_3^-$, K$^+$ and urea secreted (enterosorbed). In the colon (30 min experiment) fluid, HCO$_3^-$, K$^+$ and urea are secreted, Na$^+$ and Cl$^-$ absorbed. Instillation of pure water in the jejunum is followed by absorption of fluid and secretion of solutes which reach concentrations similar to those in plasma. In the colon, during the 30 min test, both absorption and enterosorption of fluid take place while the concentration of Na$^+$, Cl$^+$, HCO$_3^-$ and urea are lower than in plasma; after 60 min, absorption of fluid occurs. The equilibrium concentrations in the jejunum are: osmolarity 296.0 milliosmoles/l, Na 78.6^+ mM/l, Cl$^-$ 24.6 mM/l, HCO$_3^-$ 54.8 mM/l, K$^+$ 2.2 mM/l, urea 59.9 mg/100 ml. The equilibrium concentrations in the colon are: osmolarity 184.0 mOsm/l Na$^+$ 11.6 mM/l, Cl$^-$ 12.9 mM/l, HCO$_3^-$ 25.9 mM/l, K$^+$ 16.4 mM/l, urea 1818 mg/100 ml.

9030 PASSIVE SUGAR FLUX ACROSS FROG JEJUNUM IN VITRO. (E.) Loeschke, K. (U. Kentucky Coll. Med., Lexington), D. Hare and T. Z. Csaky. *Pfluegers Arch.* 328(1):1-20, 1971.

9031 STUDIES ON THE INTESTINAL ABSORPTION OF TRIOLEIN ^{131}I AND OLEIC ACID ^{125}I DURING TREATMENT WITH CHORIONIC GONADOTROPIN. (It.) Indovina, I. (Inst. Gen. Clin. Med., Palermo, Italy), L. Scaffidi and N. Custro. *Boll. Soc. Ital. Biol. Sper.* 47(13):369-372, 1971.

9032 RATES OF ABSORPTION BY RAT INTESTINE OF PANCREATIC HYDROLYSATES OF PROTEINS AND THEIR CORRESPONDING AMINO ACID MIXTURES. (E.) Crampton, R. F. (British Indust. Biol. Res. Assoc., Carshalton, England), S. D. Gangolli, P. Simson and D. M. Matthews. *Clin. Sci.* 41(5): 409-417, 1971.

9033 CATIONIC AMINO ACID TRANSPORT IN CHICKEN SMALL INTESTINE. (E.) Herzberg, G. R. (U. Maine Dept. Biochem., Orono), H. Sheerin and J. Lerner. *Comp. Biochem. Physiol.* 40(1A):229-247, 1971.

9034 INTESTINAL ABSORPTION IN DUCKLINGS (ANAS PLATYRHYNCHOS) MAINTAINED ON FRESH WATER AND HYPERTONIC SALINE. (E.) Crocker, A. D. (U. California Dept. Biol. Sci., Santa Barbara) and W. N. Holmes. *Comp. Biochem. Physiol.* 40(1A):203-211, 1971.

9035 ION TRANSPORT IN PROXIMAL AND DISTAL HALVES OF TURTLE COLON. (E.) Hajjar, J. J. (American U., Sch. Med., Beirut, Lebanon). *Comp. Biochem. Physiol.* 40(1A):39-44, 1971.

9036 GASTRIC RESORPTION OF PORPHYRIN FROM 14C HAEMOGLOBIN. (Ger.) Windorfer, A. (Univ. Pediatr. Clin., Freiburg, Germany), W. Lehnert and W. Kunzer. *Z. Kinderheilkd.* 110(3): 212-217, 1971.

See also numbers: 9200, 9362

9037 THE EFFECT OF GLUCAGON ON INTESTINAL MOTILITY AND BLOOD FLOW. (E.) Fasth, S. (U. Goteborg Dept. Surg., Sweden) and L. Hultén. *Acta Physiol. Scand.* 83(2):169-173, 1971.

Intestinal motility was recorded in anesthetized cats by a volume recording device and the intestinal blood flow by connecting the left carotid through a drop recording unit with the superior mesenteric artery by a wide bore polyethylene tube. In cats with intact adrenal glands, intra-arterial glucagon infusion induced a considerable and immediate increase of intestinal blood flow and a delayed (1 min) inhibition of motility, concomitantly with a small rise of arterial blood pressure. The above affects were all observed when the adrenal glands were denervated by severing the splanchnic nerves. However, exclusion of the adrenals by encircling ligatures eliminated the delayed motility and blood pressure rise while the intestinal blood flow increase upon glucagon infusion remained the same. After guanethidine, glucagon still induced a significant blood flow increase. Glucagon exerts its action in 2 ways: a direct effect on the vascular smooth muscles and by a release of catecholamines from the adrenal medulla which, in turn, inhibits intestinal smooth muscles.

9038 EFFECT OF ADRENERGIC FACTORS ON PERISTALSIS AND ACETYLCHOLINE RELEASE. (E.) Kažic, T. (Fac. Med., Belgrade, Yugoslavia). *Eur. J. Pharmacol.* 16(3):367-373, 1971.

Increased intraluminal pressure in isolated guinea pig ileum was a suitable stimulus for both peristalsis and acetylcholine release and study of the effects of norepinephrine and periarterial (sympathetic) stimulation or peristalsis. Simultaneous study of changes in peristaltic function and acetylcholine release was possible. Periarterial electrical stimulation at 50 cycles per second blocked peristaltic activity induced by constant intraluminal pressure and was dependent on the duration of the stimulation. Preparations taken from animals previously treated with reserpine could not be stimulated. Inhibition of peristalsis reappeared after soaking the tissue with norepinephrine. Electrical stimulation coupled with increased intraluminal pressure produced a decrease of acetylcholine release. Pretreatment with reserpine and guanethidine increased peristaltic activity and acetylcholine release and content and was recorded as not being due only to the removal of sympathetic restraint. Catecholamine depletion initiates an activation of cholenergic mechanisms and controls the activity of intramural plexuses by inhibiting acetylcholine release.

9039 THE LOCATIONS AND ACTIVITIES OF MEDULLARY NEURONES ASSOCIATED WITH RUMINANT FORE-STOMACH MOTILITY. (E.) Harding, R. (U. Edinburgh Dept. Vet. Physiol., Scotland) and B. F. Leek. *J. Physiol. (Lond.)* 219(3):587-610, 1971.

Neuronal activity, identified by air antidromic spike collision technique and bearing a temporal relationship with spontaneous reticuloruminal movements, was recorded with microelectrodes from the medulla oblongata in halothane-anesthetized sheep. The zone of gastric center activity involved the dorsal vagal nucleus and the grey reticular formation up to 1 mm dorsal and lateral to the nucleus. Records of gastric neuronal activity were probably from the vicinity of cell bodies rather than from axons. The 32 gastric center units at which the evoked vagal response included a spike which could be cancelled by a spontaneously occurring spike from the unit, were considered vagal preganglionic motoneurons. The majority of motoneurons, with conduction velocities of 10-26 m/sec and location in the dorsal vagal nucleus, innervated the reticulum or the rumen. One rumenal unit discharged during both primary and secondary cycle movements. Four types of interneurons, not orthodromically or antidromically activated by vagal nerve stimulation, were distinguishable on the basis of discharge patterns during primary cycle movements. Type A, but not types B and C, interneuron discharge was similar to that of gastric interneurons, having no resting discharge between contraction cycles. Their discharges were temporally related to either reticular contractions or rumen contractions during primary and secondary cycle movements.

9040 MESENCEPHALON AND GASTROINTESTINAL PERISTALSIS ON THE FUNCTIONAL TOPOGRAPHY OF THE MESENCEPHALIC STRUCTURES CONTROLLING GASTROINTESTINAL PERISTALSIS. (Ger.) Bernthal, I. (Inst. Med. Pharm., Bucharest), A. Faibis and E. Wawernia. *Rev. Roum. Physiol.* 8(3):227-234, 1971.

9041 THE EFFECT OF GLUCAGON ON INTESTINAL MOTILITY AND BLOOD FLOW. (E.) Fasth, S. (U. Goteborg 2nd Dept. Surg., Sweden) and L. Hulten. *Acta Physiol. Scand.* 83(2):169-173, 1971.

9042 THE RELATIONSHIP BETWEEN THE EMPTYING OF THE STOMACH AND RESPIRATION. (Ger.) Schmidt, H. (Univ. Med. Radiol. Inst., Tubingen, Germany). *Roentgenblatter* 24(8):433-436, 1971.

9043 GASTRIC STASIS AFTER VAGOTOMY. (Fr.) Benoit, D. (34 Boulevard Albert Ler, Nancy, France), J. Fays, J. C. Hoeffel and P. Gaucher. *J. Chir. (Paris)* 101(3):307-314, 1971.

9044 FURTHER STUDIES ON THE NEUROGENIC NATURE OF THE RHYTHMIC CONTRACTIONS OF

THE INTESTINE. (E.) Mishra, K. C. (All India Inst. Med. Sci, New Delhi), P. Das Gupta, T. J. Singh and R. B. Arora. *Indian J. Med. Sci.* 25(5): 315-316, 1971.

9045 USE OF OPAQUE MARKS FOR THE STUDY OF TRANSIT THROUGH THE COLON. (Fr.) Buffetaut, M. *J. Radiol. Electrol. Med. Nucl.* 52(5):285-286, 1971.

9046 THE EFFECTS OF K^+ FREE SOLUTION ON TENSION DEVELOPMENT IN THE SMOOTH MUSCLE TAENIA COLI FROM THE GUINEA PIG. (E.) Axelsson, J. (U. Goteborg Dept. Zoophysiol., Sweden) and B. Holmberg. *Acta Physiol. Scand.* 82(3):322-332, 1971.

9047 FUNCTIONAL EXPLORATION OF DIGESTIVE MOTILITY IN PEDIATRIC SURGERY. (Fr.) Arhan, P. (Infant Dis. Hosp., Paris) and C. Faverdin. *Ann. Chir. Infant.* 12(3):197-206, 1971.

9048 THE EFFECT OF DRUGS ON THE ELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED PERFUSED CANINE STOMACH. (E.) Green, W. E. R. (London Hosp.) and J. D. Hardcastle. *J. R. Coll. Surg. Edinb.* 16(5):264-265, 1971.

9049 INHIBITION OF GASTRIC MOTILITY BY ENDOTOXIN (BACTERIAL LIPOPOLYSACCHARIDE) IN CONSCIOUS GOATS AND MODIFICATION OF THIS RESPONSE BY SPLANCHNECTOMY, ADRENALECTOMY OR ADRENERGIC BLOCKING AGENTS. (E.) Van Miert, A. S. J. P. A. M. (State U., Inst. Vet. Pharmacol. Toxicol., Utrecht, Netherlands). *Arch. Int. Pharmacodyn. Ther.* 193(2):405-414, 1971.

9050 THE STOMACH AS A PUMP. (E.) Nelsen, T. S. (Stanford U. Sch. Med., Calif.) and S. Kohatsu. *R.C. Rom. Gastroenterol.* 3(2): 65-71, 1971.

9051 SUPPORT FOR THE SLIDING MODEL HYPOTHESIS ON THE CONTRACTION OF THE INTESTINAL SMOOTH MUSCLES. (Ger.) Anonymous. *Hippokrates* 42(3):374-375, 1971.

9052 SALIVARY SECRETION IN THE RAT IN A HOT ENVIRONMENT. (E.) Elmér, M. (U. Lund Dept. Physiol., Sweden) and P. Ohlin. *Acta Physiol. Scand.* 83(2):174-178, 1971.

Rat submaxillary gland secretion started after 35-45 min and ceased after 75-85 min exposure to an ambient temperature of 40° C; animals died after 90-100 min exposure. The maximal secretory rate of the normally innervated gland was 3.5 drops of saliva/min, while sympathetic denervation reduced the rate to 63% of controls and parasympathetic denervation to about 3%. Salivary flow usually reached its maximum within 10 min after the secretion had started. Electrical stimulation of the chorda-lingual nerve caused a secretion of saliva from the submaxillary gland; the maximal secretory rate was 3.8 drops/min reached at a frequency of 20 shocks/sec. The secretory rate produced by exposing the sympathetically denervated rats to 40° C (2.2 drops/min), corresponds to an impulse frequency of 10 shocks/sec. Secretion in sympathetically denervated rats in 36° C (2 drops/min) corresponds to about 5 shocks/sec in the chorda lingual nerve. Salivary secretion evoked by heat stress is mainly mediated by the parasympathetic secretory nerves, although the sympathetic fibers also take part.

9053 THE PRESENCE OF SULFATE ESTERS IN ESOPHAGEAL GLANDS OF THE HUMAN *CARDIA VENTRICULI*. (Fr.) Lambert, R. (E. Herriot Hosp., Lyon, France), A. Bérard and C. André. *C. R. Soc. Biol. (Paris)* 165(1):91-93, 1971.

In 3 human tissue samples, histochemical study of the subepithelial, mucus-secreting glands of the *cardia ventriculi*, on either side of the gastroesophageal, epithelial junction, showed the presence of sulfate esters and carboxyl groups in the upper (esophageal) glands alone. *In vitro* incorporation of radioactive sodium sulfate was also demonstrable, in these esophageal glands, as was the presence of sulfate esters in the submucosal glands of the thoracic esophagus. It is concluded that the mucous secretions of the esophagus may be a significant source of glycoprotein sulfate contamination when human gastric secretions are collected by means of a buccal sound.

9054 KALLIKREIN, TRYPSIN-LIKE PROTEASES AND AMYLASE IN MAMMALIAN SUBMAXILLARY GLANDS. (E.) Bhoola, K. D. (U. Bristol Dept. Pharmacol., England) and G. Dorey. *Br. J. Pharmacol.* 43(4):784-793, 1971.

Kallikrein, trypsin-like proteases and amylase concentration was measured in cat, dog, rabbit, rat, hamster and guinea pig submaxillary glands. No amylase was detected in cat, dog and hamster submaxillary gland, a small amount was seen in rat and rabbit, and the highest concentrations were observed in the guinea pig. Unlike kallikrei and trypsin-like proteases, amylase showed a dominant movement towards the cathode in the electrophoretograms. Trypsin-like proteases hydrolyzing the synthetic substrate benzoyl arginine p-nitroanilide were detected in the extracts of only the rat, hamster and the cat. Submaxillary gland extracts of the 6 species showed a wide variation in kallikrein content; however, the esterase activity in the extracts did not correlate with the kininogenase activity of kallikrein. Both activities in each of 6 species were affected by proteinase inhibitors, but not similarly, suggesting that mammalian submaxillary kallikreins are not identical proteins.

9055 MOLECULAR PROPERTIES OF RAT PANCREATIC AND PAROTID α-AMYLASE. (E.) Sanders, T. G. (U. British Columbia Dept. Zool., Vancouver Canada) and W. J. Rutter. *Biochemistry* 11(1): 130-136, 1972.

Both disc gel electrophoresis and isoelectric fractionation distinguished between rat pancreati and parotid gland purified alpha-amylases, 2 major species of the pancreatic enzyme were resolved by isoelectric fractionation. Double diffusion analysis against rabbit antibodies to the pancreatic enzyme also revealed differences between the 2 glandular amylases. Both sources of amylase revealed a protein of molecular weight 56,000 g/mole either in the presence or absence of 6M guanidine hydrochloride - 0.1 M 2-mercapto-ethanol indicating an apparent single polypeptide chain subunit structure. Amino acid compositions were qualitatively similar, but differences in amounts of several residues were evident. Pancreatic and parotid amylase are apparently products of different genes; subunit hybridization as a cause of the observed multiple molecular forms of the enzyme is not a probable hypothesis. Amino acid analysis of amylases from various sources suggests that sequence homology exists among mammalian, fungal and bacterial alpha-amylases, but shows no such evolutionary relatior ship between these enzymes and beta-amylases of plants.

9056 METABOLISM OF SORBITOL MODIFIED BY ETHANOL IN RATS FED WITH A CHOLINE-DEFICIENT OR CHOLINE-SUPPLEMENTED LOW PROTEIN HIGH FAT DIET. (E.) Hillbom, M. E. (State Alco Monopoly, Helsinki). *Life Sci.* [*II*] 10(16): 927-938, 1971.

9057 DIGESTIVE ENZYMES IN BODY FLUIDS. (Ge Fritsch, W. P. (U. Dusseldorf Ist Med. Clin., Germany) and W. Rick. *Krankenhausarzt* 44(9):418-434, 1971.

9058 EXPERIMENTAL STUDY ON THE EFFECT OF HIGH FREQUENCY RADIATION ON THE SECRETORY FUNCTION OF THE STOMACH. (Pol.) Wróblewski, T. (Med. Acad. Inst. Gen. Dis. Pathol., Warsaw, Poland) and K. Zarzecki. *Acta Physiol. Pol.* 22(5):609-616, 1971.

Total body microwave irradiation (without hyperthermia) of 8 dogs (1 hr/day, wave length 10 cm, power density 5 milliwatts/cm^2, frequency 1,200 cycles/second) for 24 consecutive days caused a marked increase in volume of post-histamine gastric secretion, an increase in free and total HCl, and an increase in proteolytic capacity. Autopsy examination revealed marked changes (hypertrophy, ecchymosis, erosions, ulcerations) in the mucous membrane of the duodenum. It is suggested that the secretory changes are probably due to disturbances in the neural regulation, but the possibility of a direct influence of high frequency radiation on the mucosa should not be excluded.

9059 THE EFFECT OF GASTRIN-LIKE OLIGOPEPTIDES AND 15-LEUCINE HUMAN GASTRIN I ON GASTRIC SECRETION IN DOGS. (Ger.) Welsch, K. H. (U. Munich Surg. Polyclin., Germany), H. Bauer, E. Wünsch and F. Holle. *Z. Gastroenterol.* 9(3):185-194, 1971.

The gastric secretion (using the Heidenhein pouch after vagal denervation) was measured at 15 min interval during slow i.v. infusion of different doses of tetrapeptide (0.006 - 0.030 mg/kg), pentapeptide (0.004 - 0.030 mg/kg), heptapeptide (0.004 - 0.030 mg/kg) and gastrin I (0.002 - 0.010 mg/kg). In all dosages used the test substances caused a highly significant increase in gastric secretion. The dose required for maximal secretion was higher (0.009 mg/kg) for tetrapeptide than for the other substances (0.006 mg/kg). There was a strong to complete correlation between gastric secretion and stimulation with gastrin I and tetra- penta- or heptapeptide in maximal dosages. Continuous infusion of these peptides in supramaximal dosages did not lead to inhibition of gastric secretion in dogs.

9060 EFFECT OF ADENOSINE 3',5'-CYCLIC MONOPHOSPHATE ON BASAL GASTRIC ACID SECRETION IN MAN. (Ger.) Mertz, D. P. (Univ. Med. Polyclin., Freiburg i. Br., Germany), K. Mann and R. Jahr. *Klin. Wochenschr.* 49(16):936-939, 1971.

Intravenous administration of cyclic adenosine 3',5'-cyclic monophosphate (cAMP) to 12 subjects (with normal cardiovascular systems) in 0.5 mg/kg/min dose had no effect on volume and secretory rate of hydrogen ions and chloride, but in 1.0 and 1.5 mg/kg/min doses it caused weak but statistically significant stimulation of hydrochloric acid secretion during the infusion period. The effect was less pronounced than the maximal stimulation elicited with pentagastrin (6 μg/kg s.c. or 1.2 μg/kg/hr i.v.). Serious side effects (pain in abdomen, head, back, extremities, and numbness and tingling in fingers, lassitude and giddiness) prevented the use of cAMP in larger doses. It is concluded that cAMP plays an important role in the production and secretion of gastric acid in man.

9061 INHIBITION OF GASTRIC H^+ SECRETION BY ACETYLCHOLINE IN THE ISOLATED GIZZARD OF FISTULA CHICKENS. (E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):57-60, 1971.

The effect of infusion of acetylcholine into the isolated gizzard on gastric H^+ secretion was studied in 3 white Leghorn chickens with gastric fistulas. The mean H^+ output remained constant (0.70 mEq/30 min) during perfusion of the isolated gizzard with saline. Infusion of a 1% solution of acetylcholine chloride was followed by a significant decrease in the mean H^+ outputs when compared with controls. On the other hand, no gastric stimulation occurred during the perfusion of the isolated gizzard with acetylcholine. The data suggest that the gizzard exerts an inhibitory hormonal function in addition to its previously suggested mechanical function.

9062 THE DISAPPEARANCE OF ACETYLSALICYLIC ACID (ASA) IN AQUEOUS SOLUTION FROM THE CAT STOMACH AND ITS INFLUENCE ON THE TRANSMUCOSAL ION TRANSPORT IN THE INNERVATED NON-SECRETING STOMACH. (E.) Frenning, B. (U. Uppsala Dept. Physiol. Med. Biophys., Sweden). *Acta Physiol. Scand.* 83(2):235-246, 1971.

Salicylate and hydrogen ion concentrations decreased during instillation of aqueous solutions of acetylsalicylic acid into innervated, non-secreting whole stomach pouches in the cat. Volume was decreased by 20-25%, but secretion did not affect acetylsalicylic acid absorption. After an instillation of about 16.5 mM acetylsalicylic acid in aqueous solutions, the changes in H^+, Cl^- and Na^+ concentrations were greater during a subsequent instillation of HCl than before. Since there were no appreciable volume changes, the net effluxes of H^+ and Cl- ions and the net influx of sodium ions were also increased. A 2-fold increase in pepsin output was seen during instillations of HCl after acetylsalicylic acid administration. The permeability-increasing effect of acetylsalicylic acid is probably due to loosening of the mucosa with a consequent increase of the extracellular space.

9063 GASTRIC STIMULATION BY SUBCUTANEOUS INFUSION OF HISTAMINE IN FISTULA CHICKENS. (E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):15-24, 1971.

The effect of s.c. infusion of histamine on gastric secretion was studied in 10 white Leghorn chickens with gastric fistulas. The secretory rate increased progressively with increasing doses of histamine over a range of 75-1200 µg histamine/kg/hr. As for volume rate, H^+, Cl^- and K^+ output increased gradually after histamine infusion with the mean maximal response occurring with the highest doses of histamine. The pepsin output also increased progressively to a maximal response with the highest doses of histamine. By contrast to the other secretory products, the mean Na^+ output showed no clear response to histamine during steady state secretory conditions. However, the mean Na^+ output displayed a shortlived response to the three highest doses of histamine with peak values occurring in the first 30 min after starting the infusion, or during rising gastric secretion, followed by a fall to basal secretory levels during steady state secretion. The gastric secretory response of water, H^+, Cl^-, K^+ and pepsin to histamine infusion conformed to Michaelis-Menten kinetics.

9064 GASTRIC STIMULATION BY SUBCUTANEOUS INFUSION OF URECHOLINE IN FISTULA CHICKENS. A COMPARISON TO HISTAMINE AND PENTAGASTRIN. (E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):25-33, 1971.

The effect of s.c. infusion of bethanechol (urecholine) on gastric secretion was studied in 9 white Leghorn chickens with gastric fistulas and compared with results obtained with histamine and pentagastrin. The mean maximal response elicited by bethanechol during the 30-min period of steady state secretion was significantly lower than those evoked by histamine and pentagastrin. Infusion of 200 mg/kg/hr of bethanechol was required before the mean basal volume rate, H^+ output, Cl^- output, and K^+ output were raised. With all four parameters, maximal response was reached with the highest doses. Infusion of 400 g/kg-hr was required to elevate the Na^+ output above its mean basal level, but then the Na^+ output increased progressively with increasing doses up to 1600 µg/kg-hr. Unlike the situation for water and electrolytes, the mean basal pepsin level was exceeded already during infusion of 100 µg/kg-hr; however, as with the other secretory products, a mean maximal response was found with the highest doses. The relationship between dose of bethanechol and gastric response conformed to Michaelis-Menten kinetics.

9065 INTRAVENOUS INJECTION OF 2-DEOXY-D-GLUCOSE IN GASTRIC FISTULA CHICKENS. (E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):35-40, 1971.

The effect of i.v. administration of 2-deoxy-D-glucose (2-DG) on gastric secretion was studied in 4 white Leghorn chickens with gastric fistulas. The mean basal secretory rate remained nearly constant at about 6.0 ml/hr for the first 3 hr and then fell to 5.2 ml/hr in the fourth hr and 4.2 ml/hr in the fifth. The mean secretory rate showed a tendency to decline with increasing doses of deoxyglucose from a mean basal level of 4.7 to 2.6 ml/hr with 400 mg/kg. The mean H^+ output also showed a decreasing tendency with increasing doses of deoxyglucose from a mean basal level of 0.68 to 0.38 mEq/hr with 400 mg/kg. The mean pepsin output tended to stay at the mean basal level of 15,000 P.U./hr without showing any significant response to the various deoxyglucose doses. Thus, i.v. injection of deoxyglucose failed to stimulate gastric secretion in these chickens.

9066 GASTRIC STIMULATION BY SUBCUTANEOUS INFUSION OF CHOLECYSTOKININ-PANCREOZYMIN IN FISTULA CHICKENS. (E.) Burhol, P. G. (U. Alabama Med. Ctr., Birmingham) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):41-48, 1971.

The effect of s.c. infusion of cholecystokinin-pancreozymin (CCK-PZ) on gastric secretion was studied in 5 white Leghorn chickens with gastric fistulas. A significant rise in secretory rate occurred with infusion of 24 and 48 U/kg-hr from a mean basal level of 5.9 ml/30 min to a mean maximal response of 10.1 ml/30 min. H^+ output was significantly elevated during infusion of 24 and 48 U/kg-hr from a mean basal level of 0.77 mEq/30 min to a maximum of 1.45 mEq/30 min. Following infusion of 24 and 48 U/kg-hr the mean Cl^- output was also increased significantly (0.93 to 1.67 mEq/30 min). Infusion of 48 U/kg-hr was required before a significant increase in K^+ output occurred, while Na^+ output showed no significant response to CCK-PZ. A significant rise in pepsin output was noted during infusion of 24 and 48 U/kg-hr from a mean basal level of 7,230 P.U./30 min to a mean maximal response of 12,770 P.U/30 min. The ratio of pepsin output to H^+ output remained nearly constant around the mean basal level of 9,550 P.U./mEq during infusion of CCK-PZ. The kinetics of the CCK-PZ-stimulated gastric response conformed to Michaelis-Menten kinetics.

9067 GASTRIC INHIBITION BY SUBCUTANEOUS INFUSION OF SECRETIN IN FISTULA CHICKENS. (E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway) and B. I. Hirschowitz. *Scand. J. Gastroenterol.* 6(Suppl. 11):49-55, 1971.

Gastric secretion tended to fall gradually during s.c. infusion of secretin. The secretory rate fell significantly during infusion of 24 and 48 U/kg-hr from a mean basal level of 6.3 ml/30 min to 3.3 ml/30 min. Gastric output of H^+, Cl^- and

K^+ also decreased significantly during infusion of 24 and 48 u/kg-hr of secretin. Pepsin output fell significantly during secretin infusion from a mean basal level of 0.08 mEq/30 min to 0.03 mEq/30 min. While the gastric Na^+ output tended to fall with the highest doses, this fall was not significant. The ratio of pepsin output to H^+ output was constant at various doses of secretin.

9068 DETERMINATION OF ELECTROGENICITY OF FROG GASTRIC MUCOSA IN CHLORIDE-FREE SOLUTIONS BY USING BARBITURATES. (E.) Dinno, F. (U. Louisville Dept. Phys., Ky.), M. Dinno, C.-H. Lee, M. Schwartz and T. N. MacKrell. *Proc. Soc. Exp. Biol. Med.* 138(2):479-481, 1971.

The concentration of secobarbital added to the chloride-free nutrient solution bathing frog gastric mucosa was increased in steps of 0.2 mM up to 1.6 mM. The resistance increased as much as 67% above control levels as the H^+ secretory rate decreased toward zero. The absolute magnitude of the negative potential difference decreased towards zero with decreasing $H+$ rate. Similar results were obtained with thiamylal. Washing both sides with solutions without barbiturate restored the parameters to near control levels. Barbiturates can be used to reveal the linear relationship between the potential difference and the H^+ rate and to obtain estimates of electrical parameters of the H^+ secretory mechanism in chloride-free solutions.

9069 EFFECT OF NICOTINIC ACID ON GASTRIC SECRETION OF ACID IN HUMAN SUBJECTS AND IN DOGS. (E.) Andersson, S. (Karolinska Inst., Stockholm), L. A. Carlson, L. Orö and E. A. Richards. *Scand. J. Gastroenterol.* 6(8): 693-698, 1971.

The effect of nicotinic acid on basal gastric acid secretion was studied in 19 patients with coronary heart disease and hyperlipemia and in 3 dogs with Pavlov pouches. Plasma levels of cholesterol and triglycerides were lowered by nicotinic acid administration in all patients. Nine of the 19 patients were achlorhydric, both before and after one week of nicotinic acid treatment. Three of these 9 patients had true achlorhydria, whereas all those treated with betazole responded. Of the 10 subjects who had basal acid secretion, the gastric acid secretion in response to 0.5 g of nicotinic acid increased in 9 patients after treatment with nicotinic acid for one week. After 2-6 months of treatment, 8 of 10 patients showed a reduction of the one-hour basal output after 0.5 g nicotinic acid to or even below the pretreatment levels of secretion. Of the 19 subjects the 2 in whom side effects occurred had no acid response to nicotinic acid. Thus, these side effects may have been produced by a local irritant action on the mucosa, similar to that of acetylsalicylic acid. In all 3 dogs the gastric output increased significantly in response to nicotinic acid.

9070 GASTRIC SECRETION IN TOLBUTAMIDE-PROVOKED HYPOGLYCEMIC DOGS. (E.) Cannata, B. (Cuyo Natl. U. Sch. Med. Sci., Mendoza, Argentina), A. Alonso, C. Zeolite, R. Born, E. Figueroa and J. R. E. Suárez. *Acta Gastroenterol. Lat. Am.* 3(1):17-20, 1971.

In mongrel dogs under anesthesia, various parameters of gastric secretion were studied during a 2-hr perfusion with tolbutamide by venoclysis. There was a 50% reduction in blood sugar within 30 min. The concentration of pepsin was greater than control at 30 and 60 min, but not at 90 and 120 min. There were no significant changes in secretory volume during the 2-hr period. Acid secretion during the first hr was greater than that during the second hr. The value of gastric pH during the first hr was lower than during the second, but this difference was not significant.

9071 SECRETION OF HYDROCHLORIC ACID BY EX VIVO ISOLATED CANINE STOMACH. (E.) Kowalewski, K. (U. Alberta Surg.-Med. Res. Inst., Edmonton, Canada) and R. Scharf. *Scand. J. Gastroenterol.* 6(8):675-681, 1971.

The effect of in vitro oxygenation of blood used to perfuse the isolated ex vivo canine stomach on acid secretion was studied by circulating the blood through a bubble oxygenator. All stomachs perfused with homologous blood, oxygenated by supporting in vivo dogs, secreted juice with a high concentration of H^+ and Cl^- and a low concentration of Na^+. None of the stomachs perfused for 4-7 hr with autologous or homologous blood oxygenated with a bubble oxygenator secreted HCl. The secretion in stomachs perfused in vitro had a very high concentration of Na^+ and a low concentration of Cl^-. In all cases where the methods of perfusion were alternated by rapid disconnection of the bubble oxygenator and replacing it by the supporting dog, HCl appeared and its concentration rapidly increased simultaneously with the increase in the concentration of Cl^- and decreased in the concentration of Na^+. Thus, the secretory insufficiency of parietal cells associated with the perfusion of ex vivo canine stomachs in the in vitro system was not the result of permanent damage.

9072 PROTECTIVE ACTION OF DEGLYCYRRHIZINIZED LIQUORICE ON THE OCCURRENCE OF STOMACH ULCERS IN PYLORUS-LIGATED RATS. (E.) Andersson, S. (Karolinska Inst., Stockholm), F. Bárány, J. L. F. Caboclo and T. Mizuno. *Scand J. Gastroenterol.* 6(8):683-686, 1971.

The effect of deglycyrrhinized liquorice on gastric secretion and ulcer frequency was studied in pylorus-ligated male Sprague-Dawley rats. While doses of 25 mg resulted in an insignificant reduction in the number of ulcers, a clearer protective effect was observed with doses of 50 mg. Doses of 100-200 mg gave complete protection in most animals. With a protecting dose of 75 mg which produced a marked reduction in ulcer frequency, neither perforations nor deaths occurred. The majority of ulcers appeared in the rumen portion of the stomach (95.7%). With 75 mg there was a significant reduction of both volume and acid output, while the concentration was increased. With 100 and 200 mg there was additional slight reduction of volume and acid output, whereas no difference in acidity was observed. Boiling the liquorice extract decreased the effectiveness of the protection. It is suggested that a specific thermolabile ulcer-protecting factor exists in the liquorice extract.

9073 THE EFFECTS OF SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN ON THE STOMACH. (Fr.) Duffaut, M. (Purpan Hosp., Toulouse, France), R. Tournut and A. Ribet. *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):237-252, 1971. (98 references)

A review and discussion concludes that both substances control duodenal alkalinity through the flow of pancreatic and biliary secretions and also prevent excessive acidification of the duodenum by inhibiting gastric motility and secretory activity.

9074 MECHANISMS RELATING GASTRIC ACID SECRETION AND MUCOSAL BLOOD FLOW DURING GASTRIN AND HISTAMINE STIMULATION. (E.) Reed, J. D. (Univ. Med. Sch., Newcastle upon Tyne, England) and J. R. Smy. *J. Physiol. (Lond.)* 219(3):571-585, 1971.

There was no change in the relationship between the increase in mucosal blood flow and the increase in acid secreted in response to most forms of gastrin stimulation (pentapeptide, gastrin extract). This relationship varied markedly during histamine stimulation. The ratio decreased progressively with time during infusions of both large and small doses of histamine, and with the large dose, the ratio was higher in each period than in the corresponding periods with all other forms of stimulation. Possibly larger doses of histamine produced sufficient hypotension to reduce the gastric perfusion in spite of mucosal vasodilatation. Differences shown in the ratio of change in mucosal blood flow to change in acid secretion with histamine and gastrin stimulation provide further evidence that the amidopyrine clearance technique measures gastric mucosal blood flow.

9075 SPLANCHNIC NERVE INHIBITION OF GASTRIC ACID SECRETION AND MUCOSAL BLOOD FLOW IN ANAESTHETIZED CATS. (E.) Reed, J. D. (Univ. Med. Sch., Newcastle upon Tyne, England) and D. J. Sanders. *J. Physiol. (Lond.)* 219(3):555-570, 1971.

Pentapeptide or histamine (i.v.) stimulated gastric secretion and mucosal blood flow was inhibited by efferent splanchnic nerve stimulation in cats if elevated blood pressure was prevented. Mucosal blood flow stimulated by isopropylnorepinephrine infusions was also reduced by splanchnic stimulation, again barring rises in blood pressure. The inhibitory effect of splanchnic nerve stimulation is not due to reducing the amount of stimulant arriving at the gastric mucosa, but may be due to vasoconstriction. It is possible that a direct inhibitory effect on the parietal cells exists.

9076 THE QUANTIFICATION OF AN ACID STABLE ESTERASE IN HUMAN GASTRIC JUICE BY SINGLE LINEAR IMMUNODIFFUSION. (E.) Rapp, W. (Univ. Med. Clin., Heidelberg, Germany). *Clin. Chim. Acta* 36(1):5-15, 1972.

Single linear immunodiffusion was used to quantitatively determine an antigenic acid-stable esterase of human gastric juice, gastric mucus, and gastric mucosa. The diagnostic significance of the esterase in gastric secretions was investigated. Three different concentrations of esterase in lyophilic gastric mucosa were used. The antisera were obtained from rabbits immunized with purified enzyme and the esterase was purified by DEAE-chromatography and Sephadex G 200 gel-filtration. Results were determined by use of a specific computer program. The fractions of gastric juice was routinely collected from normal volunteers and patients after betazole (1.7 mg/kg body weight) stimulation. Base values were obtained prior to stimulation. The secretion of esterase was rectilinear when the logarithm of the esterase concentration was plotted as a function of the migration distance and values within a concentration range of 189 to 8.9 mg% was noted. Identical samples expressed variations of 3% when run simultaneously in different tubes. With different batches the error was 3.5 to 5%.

9077 THE CARBOHYDRATE CONTENT OF MUCOSAL BIOPSIES. (E.) Barton, W. (U. Bristol Dept. Med., England), P. Brown and J. R. Clamp. *Clin. Chim. Acta* 36(1):262-263, 1972.

Study of 32 mucosal biopsies showed that both the gastric mucosal biopsy and the fractions of free gastric mucus contained the same monosaccharides, namely fucose, mannose, galactose, N-acetyl-glucosamine, N-acetyl-galactosamine, and sialic acid. There was close agreement between the proportions of monosaccharides in the insoluble and soluble fractions of free mucus and in the biopsies. The carbohydrate content was determined by gas-liquid chromatography. The gastric biopsy was limited to the mucosal layer by the size of the forceps and its composition confirmed histologically and chemically. The mucus was distributed as a continuous, adherent mucus layer over the epithelial surface and every sixth cell was found to be a goblet cell largely filled with mucus. These findings suggest the carbohydrate composition of mucosal biopsy is contributed by the epithelial surface mucus and by the goblet cell content.

9078 ROLE OF GENETIC FACTORS IN THE STIMULATING EFFECT OF GASTRIN PENTAPEPTIDE ON HYDROCHLORIC ACID SECRETION IN STOMACH. (Rus.) Salganik, R. I. (Inst. Cytol. Genet., Novosibirsk, USSR), S. V. Argutinskaia and R. I. Bersimbaev. *Vopr. Med. Khim.* 17(5):516-519, 1971.

In Wistar male albino rats, weighing between 200 and 250 g, the administration of gastrin pentapeptide (4 µg/kg, with a 20-min interval between the 4 s.c. injections) resulted in a stimulation of gastric acid secretion, RNA synthesis and histidine decarboxylase activity, the latter being increased 2.5 to 3 times. The stimulatory effect of gastrin pentapeptide was inhibited by aurantin (1 mg/kg), given 30 min prior to gastrin pentapeptide, and 30 min later. Aurantin alone did not decrease gastric acid secretion in the controls. The stimulatory effect of histamine (2 mg/kg i.m.) on gastric acid secretion was not inhibited by aurantin. Histamine had no effect on RNA synthesis in gastric mucosa. Therefore, gastrin pentapeptide acts as a genetic inducer, increases DNA-dependent RNA synthesis, codes histidine decarboxylase and thereby the histamine produced acts as an intermediary in the effect of gastrin pentapeptide.

9079 COMPARATIVE EVALUATION OF THE EFFECT OF DIFFERENT CHOLINOLYTICS ON THE DEVELOPMENT OF EXPERIMENTAL DESTRUCTIONS IN THE GASTRIC MUCOSA OF ALBINO RATS. (Rus.) Barnaulov, O. D. (Leningrad Med. Inst. Sanit. Hygiene, USSR) and A. K. Savel'ev. *Farmakol. Toksikol.* 34(5): 557-560, 1971.

Effects of methylbenactyzine and its iodomethylate, hexamethonium, isoprene, atropine and its iodomethylate, arpenal, mesphenal and spherophysine on the development of gastric ulcers induced by a 6- or 24-hr pyloric ligation were studied in old male albino rats. After a 6-hr pyloric ligation, the greatest protection against ulcer formation and milder destructive changes was noted with atropine iodomethylate. After a 24-hr ligation, the greatest protection was seen with methylbenactizine and its iodomethylate and with atropine. In both groups, hexamethonium was the least effective compound tested. In another series of experiments, female rats showed a higher prevalence of gastric ulcers after pyloric ligation than males (67.4%, as compared to 23.3%). In female rats, atropine iodomethylate was the most active agent, while hexamethonium, mesphenal and spherophysine were the least protective compounds studied.

9080 INTERACTIONS IN VITRO AND IN VIVO BETWEEN DOG TRYPSIN AND DOG PLASMA PROTEASE INHIBITORS. (E.) Ohlsson, K. (Malmo Gen. Hosp., Sweden). *Scand. J. Clin. Lab. Invest.* 28(2): 219-223, 1971.

Trace amounts of dog trypsin mixed with dog serum or injected i.v. into dogs were bound mainly to the alpha-macroglobulin (82%) and to alpha-antitrypsin (18%). The relative affinity of dog trypsin for the alpha-macroglobulins and for the other trypsin inhibitors taken together was 30:1. Trypsin binding to alpha-antitrypsin was rapidly taken over by the alpha-macroglobulins in vitro as well as in vivo. Elimination of trypsin-alpha-macroglobulin complexes injected i.v. or formed in vivo followed a first-order reaction, while alpha-antitrypsin-bound trypsin disappeared much slower. Alpha-macroglobulins may function biologically as a defense mechanism against trypsin liberated in the organism. Consequently, trypsin biologically released into the intercellular space or i.v. will increase the turnover of alpha-macroglobulin and second, influence the alpha-antitrypsin metabolism.

9081 THE EFFECT OF PREDNISONE ON TOTAL PROTEIN. MUCUS AND GLUCOSAMINE CONCENTRATIONS IN GASTRIC JUICE. (E.) Florkiewicz, H. (Med. Acad. Dept. Intern. Med., Lublin, Poland). *Bull. Pol. Med. Sci. Hist.* 14(3):115-117, 1971.

9082 GASTRIC JUICE SECRETION IN CHILDREN WITH SIMPLE OBESITY. (Pol.) Nowak, S. (Med. Acad. 2nd Pediatr. Clin., Lodz, Poland), I. Planeta Malecka and S. Nowicki. *Pediatr. Pol.* 46(6):727-732, 1971.

9083 QUANTITATIVE CHARACTERISTICS OF REPARATIVE PROCESSES IN THE RAT STOMACH AFTER RESECTION OF THE FUNDAL REGION. (Rus.) Timashkevich, T. B. (Inst. Med. Genet., Moscow). *Biull. Eksp. Biol. Med.* 72(7):91-94, 1971.

9084 MATHEMATICAL MODEL OF THE RELATIONSHIPS BETWEEN THE ELECTROLYTE CONCENTRATIONS OF GASTRIC JUICE. (Fr.) Ligny, G. (Civil Hosp., Charleroi, France) and J. Manouiloff. *Bull. Soc. Clin. Hop. Charleroi* 22(3):95-102, 1971.

See also numbers: 9215, 9231, 9348

9085 EFFECT OF DOPAMINE ON PANCREATIC SECRETION IN THE DOG. (E.) Hashimota, K. (Tohoku U. Sch. Med., Sendai, Japan), S. Satoh and O. Takeuchi. *Br. J. Pharmacol.* 43(4):739-746, 1971.

Dopamine (1-10 µg), given intra-arterially in preparations of isolated blood-perfused canine pancreas, caused a profuse flow of pancreatic juice which increased with the dose given. The secretory activity of dopamine (3 µg) which decreased blood flow was approximately equal to that of secretin (0.1 unit) which increased blood flow. L-dopa arterial injections up to 100 µg were ineffective, whereas an infusion of L-dopa at a rate of 100 µg/min for 10 min caused a marked increase of secretion after a delay of 3 min but did not affect blood flow. L-dopa or dopamine (i.v.) although eliciting a marked increase of pancreatic secretion, was not as effective as intra-arterial injection. The pronounced stimulation of secretion with dopamine was not obtained with other catecholamine (norepinephrine, epinephrine, isoprenaline) used. Autonomic blocking agents did not appreciably alter the secretory response of the pancreas to dopamine. Dopamine apparently acts directly on the exocrine cells in the pancreas.

9086 EFFECTS OF FASTING AND FEEDING ON PROTEIN SYNTHESIS BY THE RAT PANCREAS. (E.) Morisset, J. A. (VA Hosp., Augusta, Ga.) and P. D. Webster. *J. Clin. Invest.* 51(1):1-8, 1972.

Male Sprague-Dawley rats were fed ad libitum or fasted for 24, 48 or 72 hr before sacrifice and removal of the pancreas for the measurement of in vitro uptake of L-phenylalanine-^{14}C. Compared with the fed controls, the decrease of incorporation of the labeled amino acid was 29%, 39% and 35% after fasts of 24, 48 and 72 hr, resp. The radioactivity of pancreatic amylase from rats fasted 48 hr was 43% of that seen in fed controls. Administration of bethanecol chloride (0.2 mg/kg, s.c.) to rats fasted for 48 hr was accompanied by a definite increase in incorporation of the label compared with similarly-fasted rats injected at that time with saline. Because changes in pool size of precursor (amino acid) and product (amylase) could be excluded, it is concluded that fasting is associated with decreased rates of pancreatic amylase and protein synthesis.

9087 DISTRIBUTION OF PANCREATIC ENZYMES BETWEEN SERUM AND RED BLOOD CELLS. (E.) Appert, H. E. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.), R. S. Yacoub, F. W. Pairent and J. M. Howard. *Ann. Surg.* 175(1):10-14, 1972.

Pancreatic juice was collected on ice by Thomas duodenal cannula in chronic dogs under constant secretin and pancreozymin stimulation and its proteins tagged with ^{125}I. Experimental dogs received an i.v. injection of 10-30 ml of labeled pancreatic juice while controls each received an i.v. sodium infusion of non-labeled pancreatic juice collected within the 3-hr period before its administration. Venous blood samples were taken from both groups before as well as during the 3-hr period subsequent to administration of pancreatic enzymes. At each time of sampling after infusion, the amylase and lipase activities of plasma were higher than those of whole blood or washed cells. The whole blood amylase activity was less than that of plasma and higher than that of the red cells. The plasma lipase levels were higher than those of the whole blood or washed blood cells, while the lipase levels of whole blood were the same as those for washed cells. Plasma activities of amylase and lipase were the highest immediately after infusion. After injection of labeled enzymes, the highest amount of radioactivity appeared in the plasma, the least in the blood cells, with intermediate amounts in whole blood. Approximately 50% of the pancreatic enzymes disappeared from the circulation within 2-4 hr after administration.

9088 EFFECT OF ETHANOL ON PANCREATIC SECRETION IN MAN. (Fr.) Capitaine, Y. (Res. Unit. Pathol., Marseilles, France), C. de Barros Mott, L. Gullo and H. Sarles. *Arch. Fr. Mal. App. Dig.* 60(8-9):193-198, 1971.

Simultaneous gastric and duodenal intubation of 12 normal male subjects, under conditions which prevented the passage of gastric juice into the duodenum, was followed by repeated determinations of lipase, amylase, trypsin, chymotrypsin and bicarbonates in the duodenal juice, before and after introduction of ethanol into the duodenum (500 ml of a 12% solution over 15 min.) or i.v. injection of a combination of secretin (1 U/kg) plus pancreozymin (3 U/kg). Following the introduction of ethanol, the secretion of the enzymes was essentially unaffected, but the mean total volume of bicarbonates in the duodenal juice was 3 times higher than in controls, approximately one-third that seen in response to secretin and pancreozymin. It is concluded that the presence of alcohol induces a statistically significant, but moderate, increase of the liberation of secretin from the duodenal mucosa.

9089 ENDOGENOUS CHOLECYSTOKININ-PANCREOZYMIN STIMULATED BY INTRADUODENAL INSTILLATIO OF MAGNESIUM SULFATE. (Sp.) Colombato, L. O. (Natl. Inst. Health, Haedo, Argentina) and H. C. Parodi. *Acta Gastroenterol. Lat. Am.* 2(3): 149-152, 1970.

In 10 normal subjects intraduodenal instillation of magnesium sulfate (40 ml of a 33% solution) or rapid i.v. injection of cholecystokinin-pancreozymin (75 units) induced highly comparable stimulation of both the gallbladder and the pancreas, as measured by secretion of lipase, bicarbonate and bilirubin. In 2 patients with malabsorption syndrome, magnesium sulfate stimulated the external secretory activity of the pancreas, but exerted no significant effect on gallbladder activity, although i.v. injection of the hormone (believed to be a single polypeptide with a dual action) induced the same responses as those seen in normal controls. There appeared to be no satisfactory explanation of the phenomenon.

9090 THE CONFORMATIONAL PROPERTIES OF THE BASIC PANCREATIC TRYPSIN-INHIBITOR.

(E.) Vincent, J.-P. (Natl. Sci. Res. Ctr., Marseilles, France), R. Chicheportiche and M. Lazdunski. *Eur. J. Biochem.* 23(3):401-411, 1971.

The conformational properties of the basic pancreatic trypsin inhibitor, which is comprised of 58 amino acids in a single polypeptide chain, have been studied using both physical and chemical techniques. The inhibitor reacts with trypsin to form an extremely stable 1:1 complex and is an excellent model of effector-receptor association. Conformational stability is unaltered at 77° C and pH 2.1 or in 6 M guanidine-HCl at pH 7.5. If the disulfide bridge Cys 14 - Cys 38 is cleared this stability is reduced. Between pH 1 and 11, there exists 3 folded isomeric forms. Form I, found near neutral pH, is the most stable. Form II is stable below pH 1.5 - 2 and becomes altered at 81° C. Form III is predominant at pH 10-11 at 20° C. Analysis of the conformational isomers I, II, and III with carboxamidomethylated inhibitor and of the carboxamidomethyl, carboxymethyl, and amino-ethyl derivatives of the modified Cys 14 - Cys 28 is reported. The acidic conformational change I ↔ II depends on the ionization of a buried carboxylate, a possible side chain of Glu 7. The alkaline isomerization I ↔ III occurs when the α-ammonium of the N-terminal residue is unmasked (pK = 9.4 at 25° C). Acetylation stabilizes a form similar to III.

9091 EFFECTS OF RESERPINE AND PRENYLAMINE ON THE L-DOPA TURNOVER IN THE RAT EXOCRINE PANCREAS.

(E.) Alm, P. (U. Lund Inst. Anat. Histol., Sweden), B. Ehinger, B. Falck and L. Nordgren. *Eur. J. Pharmacol.* 16(2):192-200, 1971.

At various intervals after injection of Sprague-Dawley rats with L-DOPA, (40 mg/kg, i.v.) the pancreases were removed and assayed for content of dopamine and DOPA. With the i.v. injection of 100 mg/kg NSD 1015 (m-hydroxybenzylhydrazine) to inhibit DOPA decarboxylase 1 hr before the injection of DOPA, there was a strong diffuse fluorescence in the basal two-thirds of the exocrine cells, with only weak or no fluorescence in the apical cells. With injection of 100 mg/kg of nialamide to inhibit monoamine oxidase 3 hr before injection of DOPA, there was a strong diffuse fluorescence over all cells and a very strong granular fluorescence 10 and 20 min. after injection of L-DOPA. After injection of 5 mg/kg of reserpine there was little increase of fluorescence over that seen in controls. Administration of reserpine before injection of NSD 1015 and L-DOPA gave a fluorescence picture similar to that obtained with NSD 1015 and L-DOPA alone. In rats receiving reserpine before nialamide and L-DOPA, the picture was similar to that seen with L-DOPA alone. The effects of prenylamine (40 mg/kg, i.v., 4 hr before L-DOPA) were similar to those with reserpine. Histochemical determinations showed that after L-DOPA, reserpine increased the exocrine pancreatic content of both dopamine and DOPA, while prenylamine decreased the content of dopamine but initially increased the content of DOPA. In rats treated with either reserpine or prenylamine, treatment with nialamide markedly increased the content of dopamine.

9092 INHIBITION IN MAN OF EXOCRINE PANCREAS SECRETION BY CALCITONIN. (Ger.)

Schmidt, H. (Univ. Med. Clin., Gottingen, Germany), R.-D. Hesch, M. Hüfner, K. Paschen and W. Creutzfeldt. *Dtsch. Med. Wochenschr.* 96(45): 1773-1775, 1971.

After a prior pancreatic stimulation with a 3-hr infusion of secretin and/or pancreozymin-cholecystokinin, calcitonin was infused over a 30-min period (salmon calcitonin 20 μg/30 min, human calcitonin 180 μg/30 min) into 10 healthy young male probands, and its effect on volume, bicarbonate, trypsin, amylase and bilirubin content in 5-min fractions of duodenal fluid examined. Calcitonin decreased the secretin-stimulated volume to 75% of its original value, the enzyme output to 50%, and had no effect on bicarbonate concentration. It decreased the pancreozymin-cholecystokinin stimulated volume to 30-40%, the enzyme output to 20%, decreased the bilirubin output, and had an inconsistent effect on bicarbonate. After combined secretin and pancreozymin stimulation, calcitonin caused an inhibition of enzyme and bilirubin output (to 40% of control), but only insignificantly affected volume and bicarbonate concentration. The inhibitory effect of salmon calcitonin lasted longer (more than 60 min after discontinuation of infusion) than of human calcitonin (30 min). During the infusion the serum calcitonin level rose 8 - 10 times the normal values, but no decrease in serum calcium level was detected. It is concluded that calcitonin has a strong inhibitory effect on the pancreozymin-stimulated secretory function of the pancreas but, in the dosages used, only slightly affects the secretin-stimulated hydrokinetic function of this organ.

9093 THE EFFECT OF L-THYROXINE ON THE PROLIFERATION OF CELLS OF THE RAT PANCREAS.

(Rus.) Markelova, I. V. (Inst. Med. Genet., Moscow) and G. F. Goriunova. *Biull. Eksp. Biol. Med.* 72(8):93-95, 1971.

9094 OPT INDUCED FLUORESCENCE OF GLUCAGON AND SECRETIN. (E.) Hakanson, R. (U. Lund Dept. Pharmacol., Sweden), H. Johansson and A. L. Ronnberg. *Acta Physiol. Scand.* 83(3): 427-429, 1971.

9095 RELATIVE UTILIZATION OF CASEIN, FISH PROTEIN CONCENTRATE AND ISOLATED SOYBEAN PROTEIN FOR GROWTH AND PANCREATIC ENZYME REGENERATION OF THE PROTEIN CALORIE MALNOURISHED BABY PIG. (E.) Pond, W. G. (New York State Coll. Agric., Ithaca), W. Snyder and J. T. Snook. *J. Nutr.* 101(9):1193-1200, 1971.

9096 PANCREATIC SECRETION AFTER SELECTIVE AND TRUNCAL VAGOTOMY IN THE DOG. (E.) Thambugala, R. L. (Roy. Postgrad. Med. Sch., London) and J. H. Baron. *Br. J. Surg.* 58(11): 839-844, 1971.

9097 THE EFFECT OF THYROIDECTOMY ON THE CONTENT OF MICROELEMENTS IN THE PANCREAS, ITS MORPHOLOGY AND FUNCTION. (Rus.) Kovtuniak, N. A. and P. I. Tsapok. *Probl. Endokrinol.* 17(3): 101-104, 1971.

9098 THE EFFECT OF LIGATING THE PANCREATIC DUCT ON DIGESTION IN THE PIG. (E.) Anderson, D. M. (ARC Inst. Anim. Physiol., Babraham, Cambridge, England) and R. W. Ash. *Proc. Nutr. Soc.* 30(1):34A-35A, 1971.

9099 THE HORMONAL CONTROL OF PANCREATIC SECRETION IN THE RABBIT. (Sp.) Murillo, A. (U. Granada Dept. Anim. Physiol., Spain) and M. A. Lopez. *Rev. Esp. Fisiol.* 27(2):131-138, 1971.

9100 CHEMICAL AND ELECTRON MICROSCOPIC STUDIES ON 5'-NUCLEOTIDASE ACTIVITY IN THE EXOCRINE PARENCHYMA AND THE SECRETION OF RAT PANCREAS. (Ger.) Putzke, H. P. (U. Rostock Inst. Gen. Spec. Pathol., Germany) and B. Ernst. *Acta Biol. Med. Ger.* 26(4):665-670, 1971.

See also number: 9601

HEPATOBILIARY TRACT

9101 METHYLVINYLMALEIMIDE FROM BILIRUBIN PHOTOOXIDATION. (E.) Lightner, D. A. (U. California Dept. Chem., Los Angeles) and G. B. Quistad. *Science* 175(4019):324, 1972.

Bilirubin was exposed to photooxidation in vitro and the photo-products were characterized. The bilirubin was irradiated for 12 hr with a medium pressure mercury lamp as an internal source while a stream of oxygen was bubbled through the reaction vessel. Thin-layer chromatography revealed the presence of methylvinyl-maleimide in a 5% yield and biliverdin which was the major product. The methylvinylmaleimide was characterized by its melting point, mass spectrum, and its nuclear magnetic resonance spectrum. The methylvinylmaleimide appears to be produced by elision of rings A and B of bilirubin via photoxidation of the enamine-like β and δ bridges. When the photolysis reaction (including oxygenation) was repeated under the exact conditions as before, except that light was omitted and the solution was kept in the dark, no methylvinylmaleimide could be detected by thin-layer chromatography. In this dark reaction, 95% of the bilirubin remained intact after 18 hr.

9102 3-METHYLCHOLANTHRENE BLOCKS HEPATIC NECROSIS INDUCED BY ADMINISTRATION OF BROMOBENZENE OR CARBON TETRACHLORIDE. (E.) Reid, W. D. (NIH, Bethesda, Md.), B. Christie, M. Eichelbaum and G. Krishna. *Exp. Mol. Pathol.* 15(3):363-372, 1971.

The effect of pretreatment with 3-methylcholanthrene (3-MC) on the induction of hepatic necrosis by various hepatotoxic agents was studied in male Sprague-Dawley rats and male C57 black/6 mice. Pretreatment with 3-MC (60 mg/kg in 3 doses) completely blocked the centrolobular necrosis seen after bromobenzene treatment (7.16 mmoles/kg) in 85% of the experimental animals. Prior treatment with 3-MC also prevented the necrosis induced in rats by administration of chlorobenzene (9.75 mmoles/kg) or α-chloronaphthalene (5.90 mmoles/kg), but did not alter the hepatotoxicity elicited by dimethylnitrosamine (0.35-1.08 mmoles/kg), thioacetamide (0.13 to 1.20 mmoles/kg) or allyl alcohol (9.15 mmoles/kg). The centrolobular necrosis induced by 2.58 mmoles/kg CCl_4 was reduced in severity by pretreatment with 3-MC, but the effect of 12.9 mmoles/kg CCl_4 was unaltered by 3-MC. 3-MC failed to block necrosis induced by bromobenzene or chlorobenzene in mice, and in some experiments it even slightly enhanced the severity of necrosis. In the rat the administration of 3-MC increased the metabolism of ^{14}C-bromobenzene but reduced the amount of ^{14}C-bromobenzene covalently bound in liver macromolecules. The data suggest that bromobenzene causes hepatic lesions by the formation of covalent bonds between a chemically reactive metabolite and tissue macromolecules.

9103 INTERFERENCE OF BERYLLIUM WITH ENZYME INDUCTION IN RAT LIVER. (E.) Witschi, H. P. (U. Montreal Fac. Med., Quebec, Canada) and P. Marchand. *Toxicol. Appl. Pharmacol.* 20(4): 565-572, 1971.

The effect of beryllium on enzyme induction in the normal and regenerating rat liver was studied. A single Be dose of 50 µmoles/kg decreased the basal (noninduced) activity of only acetanilide hydroxylase to a significant degree. The inhibition of hydrocortisone-induced tryptophan pyrrolase and 3-methylcholanthrene-induced acetanilide hydroxylase by Be was dose dependent. Be also inhibited phenobarbital-induced aminopyrine demethylase. The effect of Be on these enzyme systems was demonstrable up to 72 hr after administration, the acute LD_{50} being around 50 µmoles/kg. With the exception of acetanilide hydroxylase, the effects of Be on enzyme induction were irreversible by the third day of administration (30 µmoles/kg). In the case of methylcholanthrene induction of acetanilide hydroxylase, Be had to be injected either before the methylcholanthrene, with it or within the first 6 hr after it in order to inhibit enzyme induction within the inducing period of 24 hr. Exposure of rats to Be for 6 hr only did not affect enzyme induction in normal or regulating rat liver.

9104 EFFECT OF SORBITOL ON THE BILIGENIC FUNCTION OF THE LIVER. (Rus.) Bezkorovainaia, N. M. (Med. Inst. Ternopol, USSR). *Farmakol. Toksikol.* 34(5):586-587, 1971.

The administration of sorbitol to 6 dogs with permanent gallbladder fistulas resulted in an increase in bile secretion during a 3-4 hr period, and a decrease in the concentration of cholates, bilirubin and cholesterol in the bile. The increase in the bile secretion was accompanied in most cases by an increase in the total amount of excreted bilirubin, while the amount of bile acids was increased in 2, decreased in 3 and unchanged in 1 dog. The stimulation of cholate formation in 2 dogs was due to a more active synthesis of taurocholic and desoxycholic acids. In male rats, the rate of bile secretion was dependent upon the dose of sorbitol. Rats were less sensitive to sorbitol than dogs, and the response was generally more protracted. However, moderate inhibition of cholate secretion intervened, due to a decrease in the amount of taurocholic, desoxycholic and glycocholic acids in the bile. The total amount of bilirubin and cholesterol was increased, causing a decrease in the cholate-cholesterol coefficient.

9105 MECHANISMS OF THE INHIBITORY EFFECT OF FAT ON HEPATIC BILE SECRETION. (Rus.) Nesterin, M. F. (Inst. Nutr., Moscow), R. V. Narodetskaia and V. F. Markelova. *Vopr. Pitan.* 30(5):47-51, 1971.

In dogs fed butter, followed after 1 hr by gastrin, bile secretion was increased during the first 3 hr in a pattern similar to that noted after meat feeding; after 6 hr, bile secretion decreased in animals fed butter and other fat products. The effect of butter on bile secretion was abolished by ethanol, indicating a stimulation of gastric secretion. In dogs fed butter and treated with secretin, bile secretion was increased during the first hr and again at 4-6 hr. In dogs treated by HCl (into the duodenum) followed immediately by secretin (i.v.) the patterns of bile secretion indicated that inhibition of hepatic bile secretion was associated with inhibition of gastric juice secretion. In dogs with gastroduodenal anastomoses or fistulas, administration of butter into the intestine did not alter the pattern of bile secretion from that observed in controls. Results of these and other experiments demonstrated that dietary fats inhibit the secretion of hepatic bile by depressing gastric secretion during the first several hr; at later periods bile secretion was inhibited as a result of changes in the formation of secretin in the intestine and in the rate of hepato-intestinal circulation of bile acids.

9106 THE INFLUENCE OF EXPERIMENTALLY INDUCED HEPATOTOXICITY ON THE PRESSOR RESPONSES TO VASOACTIVE SUBSTANCES IN BEAGLE DOGS. (E.) Vogin, E. E. (Food Drug Res. Labs., Maspeth, N. Y.) and D. L. Bokelman. *Toxicol. Appl. Pharmacol.* 20(3):291-298, 1971.

The effect of ethionine (25 or 50 mg/kg for 18-20 days) and CCl_4 (2.0 ml/kg for 2 days) (p.o.) on the vasopressor responses obtained following the injection of angiotensin, norepinephrine and epinephrine was studied in beagles. The induction of hepatotoxicity by either drug was confirmed by increases in the plasma half-life of indocyanine green, and serum alkaline phosphatase or SGOT elevations. Treatment with ethionine was followed by decreases in the systolic and diastolic pressor responses to angiotensin of 35% and 24%, resp. After ethionine treatment the systolic pressor response to norepinephrine was decreased 25%, but diastolic pressor responses were not altered significantly. Following CCl_4-induced hepatotoxicity, systolic and diastolic responses to all 3 pressor agents were potentiated. Liver changes characteristic of CCl_4 and ethionine toxity were observed in treated animals.

9107 ETHANOL AND INDUCTION OF MICROSOMAL DRUG-METABOLIZING ENZYMES IN THE RAT. (E.) Singlevich, T. E. (Med. Coll. Wisconsin, Milwaukee) and J. J. Barboriak. *Toxicol. Appl. Pharmacol.* 20(3):284-290, 1971.

The effect of an ethanol solution, given in place of drinking water over a 4-week period, on the hepatic microsomal drug-metabolizing enzyme system and the effect of such treatment on the response of this system to DDT and chlorcyclizine were studied in rats. Chronic ingestion of ethanol, DDT or chlorcyclizine led to a substantial decrease in O-demethylase activity and elevated cytochrome P-450 content. When DDT or chlorcyclizine was administered along with ethanol, there was an additional but small increase in the O-demethylase activity and P-450 levels. An increase in protein content was seen in groups receiving DDT or chlorcyclizine, with or without ethanol. In groups receiving DDT or chlorcyclizine without ethanol, there was a decrease in the liver alcohol dehydrogenase activity when compared with controls. Animals receiving DDT or chlorcyclizine but no ethanol metabolized ^{14}C-ethanol to ^{14}CO2 at a comparable rate. A significant reduction in liver alcohol dehydrogenase activity was observed after chronic chlorcyclizine administration.

9108 EFFECT OF PROTEIN DEPRIVATION OF MALE WEANLING RATS ON THE KINETICS OF HEPATIC MICROSOMAL ENZYME ACTIVITY. (E.) Mgbodile, M. U. K. (Virginia Polytech. Inst., Blacksburg) and T. C. Campbell. *J. Nutr.* 102(1):53-60, 1972.

Protein deprivation (5% casein diet) reduced body weight gain by 89% whereas decreased food intake reduced it by 38%. Liver weights, as a percentage of body weights, were higher in the low protein group compared to rats on decreased food intake and controls. Microsomal protein and DNA contents were lower in the low protein animals; however, the ratio of these parameters remained unchanged for the 3 groups. Maximal velocities (Vmax) for ethylmorphine and aniline were lower in the protein-deprived group, whether these rates were expressed per mg microsomal protein, per gm liver or per 100 g body weight. The Michaelis constant (Km) for ethylmorphine was lower and that for aniline was higher in low protein diet rats. Decreased food intake also showed a similar trend but to a lesser degree. Growing animals or humans provided a diet low in protein can be expected to metabolize foreign compounds, such as drugs, pesticides, or carcinogens at a greatly decreased rate.

9109 THE IDENTIFICATION OF MONOCONJUGATES OF BILIRUBIN IN BILE AS AMIDE DERIVATIVES. (E.) Jansen, F. H. (Acad. Hosp., Louvain, Belgium) and B. H. Billing. *Biochem. J.* 125(3): 917-919, 1971.

Ammonolysis of conjugated bilirubin was an acceptable substitution reaction since bimolecular nucleophilic substitution occurs at the carbonyl atom of the esterified carboxyethyl side chain of bilirubin and bilirubin amides are formed. Four distinct chromatographic bands were obtained and immediately eluted from the silica gel with choloroform and evaporated to dryness; in this form they appeared stable. The pigments were examined by mass spectrometry and, in order of decreasing R_F values on the chromatogram, were bilirubin, 2 bilirubin monoamides (I and II) and bilirubin diamide. The complementary azobilirubin amide moiety of bilirubin monoamide I has a vinyl isomeric structure, whereas that of monoamide II has an isovinyl configuration. From rat biles, containing 85% monoconjugates, 65% of the pigments obtained after ammonolysis were bilirubin monoamides. The 2 isomeric forms were present in equal quantities. Bilirubin monoglucuronide apparently exists as a chemical entity in bile.

9110 BIOCHEMICAL AND MORPHOLOGICAL PARAMETERS OF TAUROLITHOCHOLATE-INDUCED CHOLESTASIS. (E.) Priestly, B. G. (U. Adelaide Dept. Human Physiol. Pharmacol., Australia), M. G. Côté and G. L. Plaa. *Can. J. Physiol.* 49(12):1078-1091, 1971.

Cessation of bile flow in rats after i.v. sodium taurolithocholate (dose-related cholestatic response) or bile duct ligation was accompanied by progressive elevations of serum bilirubin and SGPT. These parameters reached maximal values when bile flow was returning to normal in taurolithocholate-treated rats. Sodium taurolithocholate and taurocholic acid combination or taurocholic acid alone led to an elevation of SGPT and serum bilirubin but no cholestasis. Hepatic ultrastructural changes following sodium taurolithocholate were dilation of biliary canaliculi and endoplasmic reticulum and disorganization of the parenchymal cells. Changes were most marked at 12 hr and were reversed at 24 hr. Ultrastructural changes and reversal correlated with microsomal function as measured by zoxazolamine paralysis time and SGPT levels. Changes were consistent with obstruction of the biliary tract by sodium taurolithocholate precipitation; however, a combination of bile acids elicited hepatocyte disturbances without causing a decrease in bile flow.

9111 LIVER REGENERATION: INFLUENCE OF INTERVAL POSTEXTIRPATION ON IN VITRO GROWTH OF CELLS FROM THE REMNANT LIVER. (E.) Hays, D. M. (U. Southern California Sch. Med., Los Angeles), Y. Matsushima, I. Tedo and A. Tsunoda. *Proc. Soc. Exp. Biol. Med.* 138(2): 658-660, 1971.

Tissue from the liver of 20 groups of rats (10 with each size of resection) removed from 6 to 47 hr posthepatic resection yielded no surviving cells. Tissue removed at 48 hr, 72 hr, 4 days and 5 days yielded cells with consistent growth in all inoculated plates. This growth declined with each increase in the interval from partial resection to the time of tissue removal, e.g. from 125,250 to 44,500 cells/plate in the group with a 55% resection and from 41,250 to 24,000 cell/plate in the 25% resection group. Cells did not survive from tissue removed at 5 days and 7 days postresection (25% resection group) and at 7 days (55% resection group). Cells in the intact liver remnant following major hepatic resection may be primarily under the influence of extrahepatic factors during the initial 48-hr period of rapid cell division.

9112 EFFECTS OF AGE AND SEX ON RAT BILE ACID METABOLISM. (E.) Beher, W. T. (Henry Ford Hosp., Detroit, Mich.), K. K. Casazza and C. J. Lin. *Proc. Soc. Exp. Biol. Med.* 138(2): 645-650, 1971.

Cholic and chenodeoxycholic acid excretion are governed by first-order kinetics at all age intervals investigated. There was no sex difference in the cholic or chenodeoxycholic acid pool half-life at any age studied. Pool half-lives did not change with age from 46 through 450 days; the chenodeoxycholic acid half-lives were considerably shorter than the corresponding cholic acid half-lives in all groups. From 1-15 days, bile acid pools of male and female rats were equal in size and contained only cholic acid. However, from day 27 through 450, female rats contained major concentrations of both primary bile acids, while male rats contained only trace amounts of chenodeoxycholic acid. Cholic acid pools were similar in the 2 sexes from 1 day through 450 days. Variations within these pools were probably due to differences between the rate at which the gastrointestinal tract and other body parts develop. From 46 through 450 days, the pools of both sexes contained similar concentrations of the secondary bile acids (alpha- and beta-muricholic and deoxycholic acids), which did not appear until 46 days. Alternate pathways are suggested for the synthesis of the muricholic acids which do not involve chenodeoxycholic acid.

9113 ACTIVITIES OF LYSOSOMAL ENZYMES OF THE RAT LIVER AFTER ADMINISTRATION OF ETHANOL. (Ger.) Platt, D. (Justus Liebig U. Med. Clin., Giessen, Germany) and B. Schnorr. *Naunyn Schmiedebergs Arch. Pharmakol.* 270(4): 343-348, 1971.

Determination of protein concentration and bound (intralysosomal) and free (extralysosomal) activity of glucosaminoglycan hydrolases in rat livers after 1 g/kg/day i.p. administration of ethanol for 14 days revealed a significant decrease in extralysosomal hyaluronidase and β-glucuronidase activity with no change in protein concentration and β-acetylglucosamidase activity and a significant decrease in intralysosomal β-glucuronidase and protein concentration, slight decrease of intralysosomal β-acetylglucosaminidase and no change in hyaluronidase activity. Electron microscopy of liver cells showed a loose cytoplasm, swollen and damaged mitochondria with disappearance of mitochondrial cristae and defective lysosomal membranes.

9114 LIPEMIC EFFECTS OF INTERMITTENT ETHANOL INGESTION IN RATS. (E.) Barboriak, J. J. (VA Ctr., Wood, Wis.) and R. C. Meade. *Q. J. Stud. Alcohol.* 32(4):953-959, 1971.

The mean plasma triglyceride levels rose from 142 mg/100 ml on day 1 to 632 mg/100 ml on day 4 in female Sprague-Dawley rats given ethanol and corn oil repeatedly and from 37 to 98 in those receiving dextrose and corn oil. Mean liver triglycerides rose from 23.1 mg/g fresh liver to 36.7 mg/g in the ethanol-corn oil group, and decreased slightly in the dextrose-corn oil group. Whereas changes in plasma and liver fat ^{14}C-specific activity did not correlate with the triglyceride levels, changes in ^{14}C activity in the plasma and lipid were related to the triglyceride levels. In male animals fed the ethanol-corn oil mixture for longer periods, the mean plasma triglycerides peaked at day 4, remained at this level until day 7 and then decreased. These changes were not seen in rats given dextrose. Thus, repeated doses of ethanol with fat have additive hyperlipemic effects, and ethanol may interfere with the normal utilization of absorbed dietary fat.

9115 DIURNAL VARIATION OF HEPATIC AMPHETAMINE CONCENTRATIONS IN MICE FED FREELY AND FED SINGLE DAILY MEALS. (E.) Bauer, W. S. (Coll. Wooster Dept. Biol., Ohio) and J. E. Perley. *J. Pharm. Pharmacol.* 23(12):976-977, 1971.

Hepatic amphetamine concentrations in mice fed freely vary significantly over a 24-hr period, and concentrations in mice fed a single daily meal appear to be shifted 12 hr out of phase. Hepatic amphetamine concentrations were highest during the night and lowest during the day in mice fed freely. High concentrations of amphetamine are correlated in time with high susceptibility to the drug. Since it was previously reported that the activities of several oxidative drug-metabolizing enzymes in mice are highest at night, the rate at which amphetamine is metabolized may not cause the rhythm. The rhythm may represent a rhythm of metabolism rather than of uptake by the liver.

9116 ELECTRON SPIN RESONANCE SPECTROMETRY AND THE DETERMINATION OF ORGAN VIABILITY. (E.) Fox, P. S. (Med. Coll. Wisconsin, Milwaukee), J. D. Lewis, H. M. Swartz and J. C. Darin. *Surg. Forum* 22:353-354, 1971.

Total hepatic ischemia was maintained in pigs for 60-240 min, followed by the restoration of normal hepatic blood flow. After ischemia of 90 min or more, specific, consistent changes were observed during electron spin resonance (ESR) spectrometry of liver biopsies. These changes increased in magnitude in proportion to the duration of the ischemia. In the 7 animals that died from hepatic failure within the first 10 postoperative days, the changes were greater and remained after restoration of normal circulation. ESR spectrometry is judged to be a valid method for evaluation of ischemic damage to porcine livers.

9117 LIVER FUNCTION AND MORPHOLOGY FOLLOWING DISTAL ILEAL EXCISION IN THE RABBIT. (E.) Schwartz, M. Z. (U. Minnesota Med. Sch., Minneapolis), R. L. Varco and H. Buchwald. *Surg. Forum* 22:355-356, 1971.

Liver function values and liver morphology were examined in rabbits that had undergone small intestine resections with anastomosis of the proximal jejunum to the lower cecum 2 yr previously. Mean values of bilirubin direct, bilirubin total, SGOT, alkaline phosphatase and BSP retention were essentially the same in these animals as in the controls. Liver tissue obtained by open biopsy showed normal histology and ultrastructure and no evidence of fatty degeneration or cirrhosis. Results indicate that excision of the distal portion of the small intestine is not toxic to the liver. Whether these data can be applied to bypass procedures in obese individuals requires further investigation; the rabbits utilized were not obese and the length of bowel excised was less than the length bypassed in the obese patient.

9118 THE EFFECTS OF MULTIPLE EXPOSURE TO HALOGENATED HYDROCARBON ANESTHETICS ON THE RAT LIVER. (E.) Bombeck, C. T. (U. Illinois Med. Ctr., Chicago), R. E. Condon, W. Schumer and L. M. Nyhus. *Surg. Forum* 22:357-359, 1971.

Rats were subjected to 1-5 exposures (2 hr/day) of halothane (1.75% in O_2 or in air), chloroform (0.6% in O_2), ether (6.0% in O_2) or O_2 alone; the animals were then sacrificed and the hexobarbital-metabolizing ability of their liver microsomes determined. All rats, with the exception of the halothane-air treated group and the air treated controls, showed a decline in hexobarbital detoxifying activity. There were no significant differences between the halothane-air treated rats and the air treated controls, while the halothane-O_2 treated rats, as well as the O_2 treated rats, showed significantly lower hexobarbital metabolizing ability. This depression in detoxifying activity was judged to be due to O_2 exposure, although the effect might initially be potentiated by the halothane, chloroform or ether. Halothane, after multiple exposures, has no effect on the hexobarbital-detoxifying ability of the rat liver.

9119 THE INTER-LIVER COMPETITION AND PORTAL BLOOD IN REGENERATION OF AUXILIARY LIVER TRANSPLANTS. (E) Chandler, J. G. (U. California Sch. Med., La Jolla), S. Lee, R. Krubel, H. Rosen, N. T. Nakaji and M. J. Orloff. *Surg. Forum* 22: 341-343, 1971.

A group of 107 rats received 30% hepatic isografts and, in addition, half this group underwent 70% hepatectomy. Revascularization of the graft and manipulation of the host liver blood supply were accomplished by 3 methods: the hepatic artery alone supplied the graft, while the host liver retained the entire splanchnic portal flow or the entire splanchnic flow supplied the graft, while the host liver received only arterial blood or both the graft and host livers received arterial flow alone, while the portal blood was shunted into systemic circulation to be received by both livers by arterial inflow. In all animals undergoing 70% hepatectomy, there was host liver regeneration, but regeneration was significantly increased when the portal blood supply was intact. All grafts with portal inflow showed good regeneration, while grafts receiving only arterial flow atrophied. Excess or deficiency of total liver mass had no effect on the extent of host or graft regeneration or atrophy. Results suggest that there is a hepatotrophic factor in the portal blood necessary for regeneration of auxiliary isografts; this trophic factor is apparently destroyed by both the regenerating and normal liver. Passage of portal blood through the host liver deprives the graft of the stimulus for regeneration.

9120 BILE ACID SYNTHESIS IN MAN: METABOLISM OF 7-HYDROXYCHOLESTEROL-^{14}C AND 26-HYDROXYCHOLESTEROL-^{3}H. (E.) Anderson, K. E. (US Naval Med. Res. Unit 2, (Taiwan), APO San Francisco, Calif.), E. Kok and N. B. Javitt. *J. Clin. Invest.* 51(1):112-117, 1972.

Seven patients requiring external biliary drainage were studied 3-25 days after gallbladder surgery. After the collection of control bile samples, an infusion of equimolar trace amounts (300-600 μg) of 26-hydroxycholesterol-^{3}H (in 6 patients) and 7α-hydroxycholesterol-^{14}C (all 7 patients) was given i.v. over a 20-min period, and bile samples were initially collected at 2-4 hr intervals for 8 hr and then for longer periods up to 24 or 48 hr. Rapid metabolism to bile acids and excretion in the bile was seen with both compounds. Of the total excreted label, 87% of the ^{3}H-compound and 90% of the ^{14}C compound was metabolized to both cholate and chenodeoxycholate. A greater proportion of the 26-hydroxycholesterol was metabolized to chenodeoxycholate than was the 7α-hydroxycholesterol. It is concluded that both these compounds can be intermediates in the human metabolism of cholesterol to bile acids and that this conversion occurs less readily after 26-hydroxylation of cholesterol.

9121 RAT LIVER PROTEINS IN EXPERIMENTAL DYSPROTEINISM. (E.) Perassi, R. (Natl. U. Cordoba, Argentina) and A. Martin. *Acta Gastroenterol. Lat. Am.* 3(1):1-6, 1971.

Experimental subjects consisted of 15 normal control rats injected with olive oil and 42 intoxicated rats injected i.p. with total cumulative doses of 0.1, 0.38, 0.51 and 0.90 ml CCl_4/100 g body weight. Immunodiffusion and immunoelectrophoresis was performed using soluble extracts of parenchymal liver cells. In intoxicated rats there was little modification of serum-like proteins which reacted antigenically with serum proteins. With immunoelectrophoresis in intoxicated rats a band with the mobility of γ-globulin appeared in most cases. The tissue proteins of the hepatic parenchymal cells, which failed to exhibit identity with serum proteins, showed a decrease or even disappearance of components with the mobility of α_1- and α_2-globulins, especially the antigen with characteristics of a glycoprotein.

9122 EXCRETION OF BILIRUBIN IN THE BILE FOLLOWING STIMULATION BY SECRETIN. (Sp.) Nasca, S. (Natl. Inst. Health, Haedo, Argentina), L. O. Colombato and H. Parodi. *Acta Gastroenterol. Lat. Am.* 2(1):19-24, 1970.

Following duodenal intubation and stimulation of bile flow by i.v. injection of secretin, tabulation was made of the mean volumes excreted by 11 normal controls, 8 patients with cirrhosis of the liver, 4 with hemochromatosis and 6 who had undergone cholecystectomy, as follows: 3.43, 5.04, 13.8 and 3.63 ml/kg/hr, resp. Comparable tabulations of the mean total bilirubin content were 2.8, 19.99, 30.89 and 13.01 mg/hour, resp. No satisfactory explanation could be found for the differences noted between patients with hemochromatosis and those with cirrhosis of the liver.

9123 PULMONARY ARTERY PORTAL VEIN SHUNT AND ITS SURGICAL APPLICATION. (E.) Abolon, K. B. (Methodist Hosp., Dallas, Tex.), A. Geumei, F. A. Bashour and G. Noteboom. *Surg. Gynecol. Obstet.* 133(6):967-970, 1971.

A new experimental operative shunt procedure, a pulmonary artery-portal vein graft, was used in dogs and compared with an end-to-side portacaval shunt procedure. Pulmonary artery-portal vein shunts delivered on the average 607.8 ml per minute of blood to the liver; more than is delivered from the splanchnic bed. Portal flows, on the average, measured 243.3 ml per minute. Mean and pulse pressures diminished peripherally with minimal pulsation in the portal vein. High pulse pressure was avoided while high flow was maintained. Possible hepatic portal vasculitis from high flow must be considered in long-term studies. Ammonia blood levels were highest in dogs with portacaval shunts and returned to normal when hepatic flow was re-established with a pulmonary-portal graft. This procedure may minimize impairment of hepatic function in cirrhotic patients with portacaval shunts and may find application in procedures in which portal vein reconstruction is not feasible or in liver transplants. Pulmonary hypertension may be ameliorated and the shunt may aid patients with transposition of the great vessels.

9124 INFLUENCE OF THE SOURCE OF PORTAL VEIN BLOOD ON DOG AUXILIARY HEPATIC ALLOGRAFT FUNCTION IN RECIPIENTS WITH HEPATIC INSUFFICIENCY. (E.) Ranson, J. H. C. (New York U. Med. Sch., N. Y.), M. Garcia-Moran, F. Becker and S. A. Localio. *Surg. Forum* 22:345-347, 1971.

Hepatic insufficiency was induced in dogs by bile duct ligation, vagotomy and gastroenterostomy. Two weeks after surgery, when mean serum bilirubin had increased to 7 mg/100 ml, the dogs were given small auxiliary hepatic allografts provided with portal vein inflow from the right common iliac vein, the gastropancreatico-splenic venous blood or the common meseric vein. The hepatic insufficiency improved only in those animals with allografts receiving venous blood of gastropancreatico-splenic origin or in animals receiving allografts from a related donor. The only allografts to consistently increase in size were those with gastro-pancreatico-splenic venous portal inflow. Mean survival for the 28 dogs surviving longer than 1 week was 23 days. Death was usually caused by sepsis.

9125 LACTATE PRODUCTION IN THE PERFUSED RAT LIVER. (E.) Woods, H. F. (Radcliffe Infirm., Oxford) and H. A. Krebs. *Biochem. J.* 125(1):129-139, 1971.

Isolated perfused liver from well-fed rats rapidly formed lactate from endogenous glycogen under aerobic condition until the concentration in the perfusion reached the concentration of lactate in the blood. The lactate-pyruvate ratio remained 8:15; pyruvate was formed in proportion to lactate. Lactate production increased with the addition of high glucose solutions (20 and 40 mM solutions) and was thought to be due to glucokinase. The addition of 5 and 10 mM glucose solutions did not increase lactate. The perfused liver released glucose until the concentration of the medium was 6 mM. Under anaerobic conditions, lactate production was high. Glucose release was rapid but both glucose and lactate production ceased when liver glycogen was depleted. Anaerobic production of lactate was increased by 20 mM glucose and D-fructose solutions. Some glucose was formed anaerobically from the 20 mM fructose. In starved rats the rate of lactate production was low and only slight response was noted after the above additions.

9126 BILIRUBIN URIDINE DIPHOSPHO-GLUCURONYLTRANSFERASE IN RAT LIVER MICROSOMES: GENETIC VARIATION AND MATURATION. (E.) Strebel, L. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and G. B. Odell. *Pediatr. Res.* 5(10):548-559, 1971.

A method for the quantitative measurement of bilirubin uridine diphospho-glucuronyltransferase (UDPGT) applicable to samples obtained by needle biopsy is described. More precise differential diagnosis of retention jaundice and of the "physiological" jaundice of the newborn may be possible. The activity of UDPGT was determined in rat liver by including UDP-N-acetylglucosamine (UDPNAG) to stabilize the acid of UDPG and thus resulted in stable values for UDPGT. A 10-20% enhancement of conjugating activity was observed in 0.15 mole KCl solution. The isolation and characterization of the conjugated bilirubin was done by solvent extraction (Weber and Schalm) and thin layer chromatography of the polar conjugates in the form of their hydroxypyrromethane AZO derivatives. Liver samples between Wistar and Sprague-Dawley rats and heterozygous and homozygous Gunn rats could be distinguished. No conjugating activity was found in the fetal livers of all strains but by postnatal day 4, UDPGT activity was within adult range.

9127 THE EFFECT OF ETHANOL ON THE TONUS OF THE SPHINCTER OF ODDI IN MAN. (Fr.) Cpaitaine, Y. (Res. Unit Pathol., Marseilles, France) and H. Sarles. *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):231-236, 1971.

In 6 fasting, cholecystectomized patients bearing a T-drain in the main bile duct, the duct was perfused for 30 seconds with a 9% saline solution at a pressure of 25 cm water, repeated to a total of 5 times, at varying intervals, prior to administration by gastric sound of 500 ml alcohol (a 12% solution, by volume), then repeated at intervals ranging from 5-90 minutes thereafter. As compared to control studies of the same patients, which substituted water for alcohol, alcohol induced a statistically significant, but moderate, increase of resistance to bile flow, on the part of the sphincter of Oddi, lasting throughout the entire observation period. There appeared to be no satisfactory explanation of the mechanism of action involved.

9128 RATES OF ELIMINATION OF SORBITOL AND ETHANOL IN THE CHOLINE-DEFICIENT FATTY LIVER. (E.) Hillbom, M. E. (Alko Res. Labs., Helsinki) and P. H. Pikkarainen. *Scand. J. Clin. Lab. Invest.* 28(3):267-270, 1971.

Only in choline-deficient rats was a significant increase in the liver to body weight ratio seen; these livers were yellow and of fatty consistency. Choline supplementation prevented the low-protein high-fat diet from inducing fatty infiltration of the liver. Both the rate of elimination of ethanol and liver alcohol dehydrogenase activity was decreased in choline-supplemented diets, probably due to acetaldehyde metabolism disturbance. The rate of elimination of sorbitol was decreased when measured in vivo in rats with choline-deficient fatty liver; the highly reduced activity of sorbitol dehydrogenase may play a key role in this effect. Sorbitol may be of use in the diagnosis of this type of fatty liver.

9129 SOME CHARACTERISTICS OF CHOLINERGIC EFFECTS ON THE PORTAL VEIN OF THE GUINEA PIG. (Ger.) v. Loh, D. (Univ. Inst. Physiol., Marburg a.d. Lahn, Germany). *Pfluegers Arch.* 330(1):90-98, 1971.

Cholinergic effects on spontaneously active isolated segments of guinea-pig portal vein were studied by long-term intracellular measurements of membrane potential and simultaneous recordings of mechanical activity. Acetylcholine decreased basic membrane potential and increased spike frequency with a rise in tension, in strengthening spontaneous activity. Marked tachyphylaxis was observed after repeated acetylcholine injections. Tetradotoxin (nerve blocker) or phentolamine (adrenergic blocker) had no effect on reactions to acetylcholine; atropine, however, markedly reduced or abolished reactions to acetylcholine. Acetylcholine apparently acts directly on the membrane of the muscle cells (muscarinic mechanism), indicating the existence of similarities to intestinal muscle and suggesting less specificity of the portal vein smooth muscle.

9130 EFFECT OF LIGATION OF PORTAL VEIN ON LIVER MITOCHONDRIAL METABOLISM. (E.) Ozawa, K. (Kyoto U. Fac. Med., Japan), H. Takasan, O. Kitamura, T. Mizukami, T. Kamano, H. Takeda, T. Ohsawa, T. Murata and I. Honjo. *J. Biochem. (Tokyo)* 70(5):755-764, 1971.

After portal vein ligation, mitochondrial metabolism was studied in atrophied liver (without portal circulation) and in hypertrophied liver (with portal circulation). As early as 12 hr after ligation, in rabbits, stage 3 respiration, enhanced respiratory control, increased P:O ratio and ATP synthesis were seen in hypertrophied liver. Respiratory carriers or mitochondrial enzymes like glutamate dehydrogenase, GOT and malate dehydrogenase were not increased. Glutamate phosphorylation was increased 2-fold (maximum) within 24 hr. Synthesis of ATP during oxidative phosphorylation was elevated; maximal rates of ATP hydrolysis by 2,4-dinitrophenol was also increased. Opposite effects occurred in atrophied liver, except that ATPase activity induced by 2,4-dinitrophenol was not inhibited. Mitochondrial fatty acid content increased 3-fold after 12 hr and reached control levels in 48 hr; intracellular ATP concentration then returned to normal. Depression of mitochondrial activity may be due to fatty acid elevations in mitochondria due to reduced fatty acid oxidation resulting from a lowering of the supply of ATP.

9131 FORMATION AND STABILITIES OF FREE BILIRUBIN AND BILIRUBIN COMPLEXES WITH TRANSITION AND RARE-EARTH ELEMENTS. (E.) Velapoldi, R. A. (Inst. Materials Res., Washington, D. C.) and O. Menis. *Clin. Chem.* 17(12):1165-1170, 1971.

In this study the relative rates of complex formation between free bilirubin and bilirubin complexes with transition and rare earth metals were analogous to metalloporphyrin and metal complex stabilities according to the Irving-Williams series. Rapid bilirubin degradation was noted with transition metals that formed strong, square, planar complexes. All metal ions except sodium produced either a shift toward the red or a shift toward the violet suggesting complex formation. Molar absorptivities were calculated for some of the complexes. Qualitatively the rate of decrease of Br absorption was Fe^{++}, followed by Cu^{++}, Ni^{++}, Co^{++}, Zn^{++}, and Fe^{+++}. Similar redox reactions were rated in the Fe-porphyrin system; ferric ion was oxidized to ferrous in the bilirubin complex. Only samarium, of the lanthanide complexes, showed covalent bonding tendencies. The stability of bilirubin in several solvents and under experimental conditions is reported with a note that bilirubin is photo-oxidized to biliverdin by laboratory light.

9132 THE ASSOCIATION IN VITRO OF POLYRIBOSOMES WITH RIBONUCLEASE-TREATED DERIVATIVES OF HEPATIC ROUGH ENDOPLASMIC RETICULUM. CHARACTERISTICS OF THE MEMBRANE BINDING SITES AND FACTORS INFLUENCING ASSOCIATION. (E.) Shires, T. K. (U. Wisconsin Med. Sch., Madison), L. Narurkar and H. C. Pitot. *Biochem. J.* 125(1):67-79, 1971.

Conditioning of rough-microsomal membranes with ribonuclease for acceptance of polyribosomes by apparent ribonuclease action on membrane-bound ribosomes was investigated. Pancreatic ribonuclease in EDTA conditions rough ribosomal membranes to accept exogenously-added liver polyribosomes in vitro at 0-4°C but treated smooth membrane would not interact with polyribosomes. The conditioning process decreased membrane RNA and removed polyribosomes from vesicle surfaces. Temperature changes (0-37°C) and pH change (6.9-7.8) did not alter binding to conditioned membranes but increased concentrations of KCl inhibited binding. High ionic strengths could not dislodge adventitious materials possessing polyribosome-binding capacity. Trypsin treatment destroyed binding capacity. Partial removal of 2-10 S residual RNA from ribonuclease-conditioned membrane had no effect on binding capacity but its role could not be discounted. Apparently polyribosome binding sites are intrinsic features of conditioned membranes isolated from rough microsomal fractions, and the primary factor in polyribosome interaction with these binding sites is long range ionic bonding.

9133 INFLUENCE OF INSULIN, HYDROCORTISONE AND THYROXINE ON FATTY LIVER OF RATS FED A LOW CASEIN DIET SUPPLEMENTED WITH METHIONINE. (E.) Noda, K. (Tokushima U. Sch. Med., Japan). *J. Nutr.* 101(10):1391-1397, 1971.

Young rats were fed a diet of 8% casein with (supplemented) or without (basal) addition of 0.3% methionine. Methionine-supplemented rats ate more food and had a higher hepatic lipid content than those eating the basal diet. In rats on both diets, injections of cortisone increased the hepatic content of lipid in intact or adrenalectomized rats on both diets, while administration of thyroxine had no effect on intact rats. In rats with alloxan-induced diabetes, there was a decrease in hepatic lipid content despite increased food intake. Hepatic lipid content was increased with injection of insulin in intact basal-diet and, to a lesser extent, methionine-supplemented rats; hepatic lipid was also increased with injection of insulin in adrenalectomized rats. Plasma levels of immunoreactive insulin were higher in methionine-supplemented rats than in those fed the basal diet, while plasma glucocorticoid levels were lower; there were no differences between the two groups with respect to plasma protein-bound iodine.

9134 PARTICIPATION OF LIVER FUNCTION IN THE ACUTE TOLERANCE TO PENTOBARBITAL INDUCED AFTER SHORT-TERM INFUSION. (E.) Tsuchie, F. (Nagasaki U. Fac. Pharm. Sci., Japan), M. Koida and H. Kaneto. *Jap. J. Pharmacol.* 21(4):557-558, 1971.

White male rabbits received a continuous infusion of sodium pentobarbital dissolved in saline in the ear vein on one side with periodic sampling of blood from the ear on the other side. With infusion of the drug at 20 mg/kg/hr, the drug concentration continued to increase for 3 hr, during which time hypnosis began; after this the concentration reached a ceiling and began to decline, and the animal regained the righting reflex. A similar pattern was observed with infusion at 40 mg/kg/hr, but here the animal failed to awake and the animal died from the successive increase of blood level of pentobarbital which started after 6 hr of infusion. Infusion at the rate of 100 mg/kg/hr caused a straight and rapid increase in blood level and the animal died within 1 hr. It is suggested that the elevated rate of pentobarbital metabolism was involved in the mechanism of the acute tolerance to the hypnotic action of this drug.

9135 ULTRASTRUCTURAL-MORPHOMETRIC ANALYSIS OF RAT LIVER CELL AFTER OROTIC ACID

ADMINISTRATION. (E.) Riede, U. N. (U. Basel Dept. Pathol., Switzerland), H. Strässle, L. Bianchi and H. P. Rohr. *Exp. Mol. Pathol.* 15(3): 271-280, 1971.

Male rats were fed a diet containing 1% orotic acid for 3, 5 or 7 days after which they were sacrificed and their livers prepared for electron microscopy. Morphometric examinations were made as described by Weibel and by Rohr. Values are given for the basic parameters at the different time intervals. Up to the fifth day, the volume of the single hepatocyte decreased by 25% compared with controls, while the number of liver cell nuclei increased by 35%; by day 7 these values had returned to normal. The absolute volume share of rough endoplasmic reticulum per hepatocyte decreased significantly during the entire 7-day period, amounting to 50% of control values at the end. After an initial (day 3) increase in the absolute volume share of the smooth endoplasmic reticulum per hepatocyte by 30%, this value decreased to 70% of control; from the 3rd to 7th day the absolute volume share of the smooth endoplasmic reticulum per hepatocyte decreased by a total of 60%. During the first 5 days there was a slight decrease in mitochondrial single volume followed by a doubling in the next 3 days. There was a 30% reduction of mitochondrial number per hepatocyte. By day 3 the surface density of mitochondrial cristae had doubled and the surface density of mitochondrial outer membranes per volume unit mitochondria increased 7-fold. In the early phase the absolute volume density of microbodies decreased significantly by 60%, while the single volume remained essentially constant. The absolute volume density of lysosomes decreased by 70% after 3 days. By day 3 the volume density of fat droplets quadrupled.

9136 RELATIONSHIP OF BILE SALTS AND BILE FLOW TO BILIARY EXCRETION OF IOPANOIC ACID. (E.) Moss, A. A. (U. California Sch. Med., San Francisco), J. R. Amberg and R. S. Jones. *Invest. Radiol.* 7(1):11-15, 1972.

The relation between sodium taurocholate and the biliary excretion of iopanoic acid was investigated in dogs. Increasing the iopanoic acid (alone) infusion rate from 0.13 to 0.30 mg/kg/min increased biliary excretion from 0.24 to 1.09 mg/kg/15 min; a second increase to 0.72 resulted in further increasing biliary excretion to 1.29. Iopanoic acid concentration in the bile increased as the bile flow diminished. Increasing the iopanoic acid infusion rate from 0.3 to 1.68 during constant sodium taurocholate infusions (2.65 mg/kg/min) resulted in increasing biliary excretion from 0.77 to 5.80 mg/kg/15 min. At a constant iopanoic infusion rate of 0.69 mg/kg/min, an increase in sodium taurocholate from 0.69 to 2.08 mg/kg/min did not cause a further increase in iopanoic acid excretion. Biliary excretion of iopanoic acid appeared to depend strongly on the availability of the bile salts; there was an optimum effective dose of sodium taurocholate. Iopanoic acid had no choleretic effect.

9137 STUDIES ON MYOINOSITOL. VIII. THE INCORPORATION OF ^{3}H-MYOINOSITOL INTO PHOSPHATIDYL-INOSITOL OF FATTY LIVER. (E.) Hasan, S. H. (U. Nagoya Fac. Med., Japan), Y. Nakagawa, I. Nishigaki and K. Yagi. *J. Vitaminol. (Kyoto)* 17(3):159-162, 1971.

Radioactivity was found exclusively in the phosphatidyl-inositol fraction when myoinositol-2-^{3}H was injected into male, albino rats. The total incorporation of myoinositol-2-^{3}H into phosphatidyl-inositol fraction in the fatty liver mitochondria and microsomes was higher than in the normal. Thus phosphatidyl-inositol synthesis is apparently not hampered in animals suffering from dietary fatty liver. The lipotropic action of myoinositol may be ascribed to the rapid synthesis of phosphatidyl-inositol induced by the enlarged myoinositol pool, and to the effect of phosphatidyl-inositol in promoting synthesis and secretion of beta-lipoprotein in the fatty liver.

9138 SECRETION BY THE COMMON DUCT IN RESPONSE TO SECRETIN. (E.) Nahrwold, D. L. (Pennsylvania State U. Coll. Med., Hershey). *Surg. Forum* 22:386-387, 1971.

When isolated segments of the common bile duct in dogs were perfused for 5 hr with a solution containing Na^+, K^+ and HCO_3^-, a net flux of water and all electrolytes from the blood into the lumen was observed. I.v. infusion of synthetic secretin (4 U/kg/hr), beginning after 2 hr of electrolyte perfusion, significantly increased the net flux of both electrolytes and water in the direction of the lumen. Results suggest that the common duct epithelium produces an electrolyte solution, which might contribute to the formation of bile and that secretin choleresis is at least partly due to the influence of the hormone on the large bile ducts.

9139 THE CONTROL OF GLYCOGEN SYNTHESIS IN THE LIVER. (E.) De Wulf, H. (U. Louvain Lab. Chem. Physiol., Belgium). *Verh. Vlaam. Akad. Geneeskd. Belg.* 33(1-2):76-101, 1971.

9140 NUCLEAR PORE FLOW RATES OF RIBONUCLEIC ACIDS IN THE MATURE RAT HEPATOCYTE. (E.) Franke, W. W. (U. Freiburg 2nd Inst. Biol., Germany), J. Kartenbeck and B. Deumling. *Experientia* 27(4):372-373, 1971.

9141 THE EFFECT OF CHANGES IN LACTATE UPTAKE ON THE INTRACELLULAR pH OF THE PERFUSED RAT LIVER. (E.) Cohen, R. D. (London Hosp. Med. Coll.), R. A. Iles and D. Barnett. *Clin. Sci.* 41(2):159-170, 1971.

9142 THE ORIGIN OF SERUM AMYLASE. ELECTROPHORETIC STUDIES OF ISOAMYLASES OF THE SERUM, LIVER AND OTHER TISSUES OF ADULT AND INFANT RATS. (E.) Hammerton, K. (U. Sydney Dept. Biochem., Australia) and M. Messer. *Biochim. Biophys. Acta* 244(2):441-451, 1971.

9143 COMPARATIVE STUDIES ON THE HYDROLYSIS OF ODD CHAIN AND EVEN CHAIN FATTY ACID CHOLESTEROL ESTERS BY RAT LIVER STEROL ESTER HYDROLASE. (E.) Sgoutas, D. S. (Emory U. Sch. Med., Atlanta, Ga.). *Biochim. Biophys. Acta* 239(3):469-474, 1971.

9144 CHANGES IN STRUCTURE AND MICROCIRCULATION OF THE RAT LIVER AFTER INTERMITTENT APPLICATION OF ALPHA NAPHTHYL ISOTHIOCYANATE (ANIT) FOR 12 MONTHS. (Ger.) Stefenelli, N. (U. Vienna Med. Sch.), J. H. Holzner, H. Pointner and L. Stockinger. *Virchows Arch.* [*Pathol. Anat.*] 353(4):302-311, 1971.

9145 THE INFLUENCE OF ADRENALS AND CORTISOL ON HEPATIC ESTERASES. (Ger.) Korth, S. (Free U. Steglitz Clin., Berlin), F. Winkelmann and U. M. Gross. *Virchows Arch.* [*Zellpathol.*] 8(4):318-327, 1971.

9146 THIAMINE CONTENT IN THE LIVER OF TUMOR BEARING RATS SUBJECTED TO PENETRATING RADIATION. (Rus.) Dz'ubko, N. I. (Roentgenol. Radiol. Res. Inst., Kiev, USSR). *Vopr. Onkol.* 17(6):67-69, 1971.

9147 INCORPORATION OF P^{32} AND PALMITIC ACID H^3 IN DIVERSE PHOSPHOLIPIDS OF THE LIVER AND THE INTESTINAL MUCOSA OF THE INTACT RAT. (Fr.) Clouet, E. (UER Nutr., Dijon, France), R. Paris and J. Clement. *C.R. Acad. Sci.* [*D*] *(Paris)* 273(4):515-518, 1971.

9148 EVOLUTION OF THE ENZYMATIC ACTIVITY OF CHOLESTEROL 7-ALPHA HYDROXYLASE IN REGENERATING LIVER. (Fr.) Van Cantfort, J. (U. Liege Sch., Med., Belgium). *C.R. Acad. Sci.* [*D*] *(Paris)* 273(4):491-493, 1971.

9149 INTERRELATIONSHIPS IN THE METABOLISM OF LIVER ARACHIDONOYLLECITHINS AND PLASMA CHOLESTERYL ARACHIDONATE IN THE RAT. (E.) Holub, B. J. (U. Toronto Dept. Biochem., Canada) and A. Kuksis. *Can. J. Biochem.* 49(9):1005-1011, 1971.

9150 A MULTICENTER RESEARCH JOINT STUDY ON LIVER EXTRACTS. I. EFFECT ON BALANCED DIETS. (It.) Caponi, R. (Italian Inst. Biochem., Milan, Italy), S. Gorini and U. Valcavi. *Farmaco* [*Sci.*] 26(7):627-676, 1971.

9151 THE VITAMIN A CONTENT IN THE LIVER OF DIFFERENT FREE LIVING ANIMALS. II. (Ger.) Schulze, H. (Inst. Wild Anim. Res., Ahnsen/Gifhorn, Germany), J. Treichler and G. Hannemann. *Dtsch. Tieraerztl. Wochenschr.* 78(17): 475-476, 1971.

9152 EFFECT OF BETAMETHASONE AND DEXAMETHASONE ON THE LIVER ULTRASTRUCTURE IN RATS. (E.) Garg, B. D. (U. Montreal Inst. Exp. Med. Surg., Quebec, Canada), J. D. Khandekar, D. F. Dardachti and K. Kovacs. *Indian J. Med. Res.* 59(4):604-608, 1971.

9153 BILIARY DRUG EXCRETION AND STIMULATION OF BILE FLOW. (E.) Koss, F. W. (Sch. Med., Hanover, Germany), H. Pelzer and Z. Kopitar. *Acta Pharmacol. Toxicol. (Kbh.)* 29(3):128-133, 1971.

9154 THE PASSAGE OF RADIOACTIVE LANTHANUM FROM THE BILIARY TO THE VASCULAR SYSTEM. AN ELECTRON MICROSCOPIC AND RADIOACTIVE TRACER STUDY. (E.) Schatzki, P. F. (Virginia Commonwealth U. Health Sci. Div., Richmond). *Z. Zellforsch. Mikrosk. Anat.* 119(4):451-459, 1971.

9155 TEMPORAL SEQUENCE OF THE ACTION OF SOME LIVER ENZYMES OF CARBOHYDRATE AND PROTEIN METABOLISM DURING FASTING. (It.) Livrea, G. (U. Messina Inst. Human Physiol., Italy), G. Carrozza, C. Giorgianni and G. Zimbaro. *Boll. Soc. Ital. Biol. Sper.* 47(8):221-225, 1971.

9156 THE POSTNATAL INDUCTION OF SERINE DEHYDRATASE IN RAT LIVER. (E.) Yeung, D. (U. Western Australia, Nedlands) and I. T. Oliver. *Comp. Biochem. Physiol.* 40(1A):135-144, 1971.

9157 EFFECT OF ACETOACETATE ON TYROSINE METABOLISM IN RAT LIVER. (E.) Bhai, I. (Univ. Dept. Biochem., Nagpur, India), B. Sivakumar and T. G. Reddi. *Indian J. Biochem. Biophys.* 8(1):20-22, 1971.

9158 EFFECT OF SUGAR EXCESS ON LIVER FATS. (Rum.) Bistriceanu, E. (Inst. Pharm Med., Bucharest) and I. Gontea. *Igiena (Bucur.)* 20(7):421-426, 1971.

9159 THE SECRETION OF SERUM PROTEIN AND THE SYNTHESIS OF ALBUMIN AND TOTAL PROTEIN IN REGENERATING RAT LIVER. (E.) Schreiber, G. (Univ. Inst. Biochem., Freiburg i. Br., Germany), J. Urban and J. Zahringer. *J. Biol. Chem.* 246(14):4531-4538, 1971.

9160 LIVER AMINO ACID POOL MAY BE HOMOGENEOUS WITH RESPECT TO PROTEIN SYNTHESIS. (E.) Tsukada, K. (Univ. Fac. Pharmaceut. Sci., Toyama, Japan), T. Moriyama and I. Lieberman. *J. Biochem. (Tokyo)* 70(1):173-174, 1971.

9161 PROTEIN AND ORNITHINE D-AMINOTRANSFERASE TURNOVER IN CHANG'S LIVER CELLS. (E.) Strecker, H. J. (Albert Einstein Coll. Med., New York, N. Y.) and U. B. Hammar. *J. Biol. Chem.* 246:4580-4585, 1971.

9162 THE REGULATION OF HEPATIC TRIGLYCERIDE METABOLISM BY FREE FATTY ACIDS. (E.) Kohout, M. (Vanderbilt U. Sch. Med., Nashville, Tenn.), B. Kohoutova and M. Heimberg. *J. Biol. Chem.* 246(16):5067-5074, 1971.

9163 THE ELIMINATION OF THE HEPATIC BRANCHES OF THE VAGAL NERVE OF CONSCIOUS RATS AND ITS INFLUENCE ON HEPATOGENOUS DIURESIS. INDIRECT EVIDENCE FOR THE AFFERENT VAGAL PATHWAY OF THE HEPATIC OSMORECEPTORS. (Ger.) Dennhardt, R. (Philipps U. Inst. Appl. Physiol., Marburg/Lahn, Germany), W. W. Ohm and F. J. Haberich. *Pfluegers Arch.* 328(1):51-56, 1971.

9164 SOURCE OF THE HUMORAL FACTOR THAT INITIATES HEPATIC REGENERATION. (E.) Levi, J. U. (U. Miami Sch. Med., Fla.) and R. Zeppa. *Ann. Surg.* 174(3):364-370, 1971.

9165 IN VITRO UPTAKE OF MODEL AMINO ACIDS BY RAT LIVER FOLLOWING WHOLE BODY G IRRADIATION. (E.) Yang, K. P. (U. South Dakota Sch. Med., Vermillion) and O. W. Neuhaus. *Radiat. Res.* 47(2):500-510, 1971.

9166 EFFECT OF STARVATION UPON HEPATIC INSULIN METABOLISM IN THE RABBIT. (E.) Lopez Quijada, C. (Gregorio Maranon CSIC Inst. Madrid) and E. Blazquez. *Rev. Esp. Fisiol.* 27(2): 139-142, 1971.

9167 EFFECT OF IONIZING RADIATION ON THE SUCCINATE DEHYDROGENASE ACTIVITY OF RAT LIVER. (E.) Jordana, R. (U. Navarra Dept. Physiol., Spain) and C. Lamsfus. *Rev. Esp. Fisiol.* 27(2):163-164, 1971.

9168 EXPERIMENTAL DATA ON COMPENSATORY REGENERATION OF THE LIVER AFTER LIGATION OF HEPATIC DUCTS IN NORMAL ANIMALS AND IN CIRRHOSIS. (Rus.) Vlasov, V. S. *Eksp. Khir. Anestesiol.* 16(3):24-28, 1971.

See also numbers: 9204, 9713

INTESTINE

9169 DEVELOPMENT OF MITOCHONDRIAL ENZYME ACTIVITIES IN RAT-SMALL-INTESTINAL EPITHELIUM. (E.) Iemhoff, W. G. J. (Med. Sch., Rotterdam, Netherlands) and W. C. Hülsmann. *Eur. J. Biochem.* 23(3):429-434, 1971.

Mitochondria, isolated from rat small intestinal crypt and villous cells, differ in the development of mitochondrial enzyme activities as the cells migrate to the top of the villi. Enzymes found in greater amount in crypts include 3-hydroxybutyrate dehydrogenase, monoamine oxidase, cytochrome C oxidase and succinic dehydrogenase. Those higher in the villous cells include glycerol-1-phosphate dehydrogenase and a number of matrix enzymes such as aspartate aminotransferase, glutamate dehydrogenase, acetoacetyl-COA thiolase and octanoyl-CoA synthetase. Results are reported in absolute values and as activity of villi per crypt ratio. The results indicate that the increases of mitochondrial enzyme activities reflect a differential development, not simple continuation of growth of a population of mitochondria the cell has inherited from the precursor The increase in activity of the aspartate-aminotransferase pathway is larger than the glutamate-dehydrogenase pathway which in turn is larger than the increase of succinic dehydrogenase activity as the cell goes from crypt to villus.

9170 CORTISONE-EVOKED DECREASE OF ACID β-GALACTOSIDASE, β-GLUCURONIDASE, N-ACETYL-β-GLUCOSAMINIDASE AND ARYLSULPHATASE IN THE ILEUM OF SUCKLING RATS. (E.) Koldovský, O. (Child. Hosp., Philadelphia, Pa.) and M. Palmieri *Biochem. J.* 125(3):697-701, 1971.

After injection of cortisone starting on day 9 (postnatally), no changes in specific activities of acid beta-galactosidase and beta-glucuronidase were observed 24, 48 or 72 hr later; N-acetyl-beta-glucosaminidase decreased significantly after 48 hr. All 3 beta-glycosidase activities decreased substantially after 96 hr; intestinal arylsulfatase demonstrated a similar decrease at 96 hr. Total activities of all 3 beta-glycosidases per ileum per animal were significantly lower 72 hr after the first injection both in comparison with control animals and with animals injected 24 or 48 hr before being killed. The rate of decrease was similar for all 3 enzymes; the half-life was about 0.5-0.6 day. The rate of decrease of the hydrolases in cortisone-treated animals proceeded faster than the rate of enterocyte renewal in this period. Cortisone might evoke the decrease of enzymes in cells already migrating.

9171 THE EFFECTS OF SEVERAL DRUGS ON DUODENAL pH. (Sp.) Mazure, P. A. (Natl. Inst. Health, Haedo, Argentina), J. N. Cosen and M. Schraier. *Acta Gastroenterol. Lat. Am.* 2(1):1-7, 1970.

Among 12 patients with duodenal ulcer, the mean pH value for the content of the second portion of the duodenum was below pH 6 for 31% of a 60-minute control period of continuous i.v. perfusion of physiologic saline. This was followed immediately by i.v. perfusion of pentagastrin 6 µg/kg/hr for 2 hr. During the first 30 min, the stimulant increased total gastric secretion markedly, without affecting intraduodenal pH. During the next 30 min, when it was combined with metochlopramide (40 mg, i.v.) the mean value for intraduodenal content was below pH 6 for 62% of the period, below pH 4 for 34% (as compared to 9% of the control period), below pH 2 for 9% (as compared to 2% of the control period). During the next 30 min, following administration of parapenzolate bromide (0.5-1.0 mg, i.v.), the mean pH value returned rapidly to the control level. At the end of this period, a second injection of metochlorpramide exerted the same effect as the first, with no apparent effect exerted by the long-acting anticholinergic.

9172 THE EFFECTS OF A NEW ADRENERGIC ANTAGONIST ON THE MESENTERIC CIRCULATION. (E.) Reynolds, D. G. (Walter Reed Army Inst. Res., Washington, D. C.) and K. G. Swan. *Proc. Soc. Exp. Biol. Med.* 138(2):683-687, 1971.

The alpha-adrenergic receptor blocking properties of WR-2823 in the mesenteric circulation of anesthetized dogs was assessed. Following blockade with WR-2823, the dose-response curves for either norepinephrine or epinephrine (decrease in mesenteric blood flow) was shifted to the right. WR-2823 caused epinephrine reversal of both arterial pressure and mesenteric blood flow. This adrenergic antagonist attenuated but did not reverse the vasoconstrictor effects of norepinephrine. WR-2823 also caused phenylephrine reversal of mesenteric blood flow and attenuated the initial vasoconstrictor effect of isoproterenol without potentiating the vasodilator effect of the antagonist. The fact that WR-2823 confers greater protection than phenoxybenzamine in experimental shock while at the same time acting as a less effective antagonist to the mesenteric vasoconstrictor action of norepinephrine and epinephrine suggests 2 alternatives: either the target organ theory of irreversibility in shock is inaccurate or else the locus of action in protecting the experimental shock model is other than the gut.

9173 THE EFFECT OF GLUCAGON ON ENTEROKINASE SECRETION FROM BRUNNER'S GLAND POUCHES IN DOGS. (E.) Goldman, R. B., Y. S. Kim (U. California Sch. Med., San Francisco), R. S. Jones and M. H. Sleisenger. *Proc. Soc. Exp. Biol. Med.* 138(2):562-565, 1971.

The volume of pouch secretion and protein output rose during the first 15 and 30 min of glucagon infusion, resp., and remained elevated during the 2 hr of glucagon infusion in 3 dogs. During the first 15 min of glucagon infusion, enterokinase output rose from 0.9 units/15 min (control) to a peak value of 21.6 units/15 min; mean output was 11.6 units/15 min. Enterokinase-specific activity reached its initial peak in the first 15 min and then rose to a second larger peak; mean specific activity was 8.3 units/mg protein. It is not known whether endogenously released glucagon will stimulate duodenal secretion or whether the response observed in this study was a pharmacologic effect. The pattern of glucagon-stimulated enterokinase, a double-peaked response, resembles the duodenal output of pepsin.

9174 PROTEIN SYNTHESIS IN INTESTINAL MUCOSA: THE EFFECT OF ROUTE OF ADMINISTRATION OF PRECURSOR AMINO ACIDS. (E.) Alpers, D. H. (Washington U. Sch. Med., St. Louis, Mo.). *J. Clin. Invest.* 51(1):167-173, 1972.

Labeled amino acid was injected into the lumen of *in vitro* preparations of small bowel segments of male Wistar rats. Cells at every level of the jejunal villus were able to synthesize protein equally well from ^{14}C-leucine. Compared with i.v.-administered amino acids, those administered intraluminally were utilized preferentially for protein synthesis. After i.v. administration, the greatest degree of labeling was at the villus-crypt junction, while after intraluminal administration heaviest labeling was near the villus tip. In crypt cells, small-molecular weight membrane-bound proteins were labeled preferentially, while in the villus the pattern of labeling was more evenly distributed among the different proteins.

9175 PREPARATION OF A HIGHLY PURIFIED GLYCYL-L-LEUCINE DIPEPTIDASE FROM PIG INTESTINAL MUCOSA. (E.) Norén, O. (U. Copenhagen

Dept. Biochem. C), H. Sjöstrom and L. Josefsson. *Acta Chem. Scand.* 25(5):1913-1915, 1971.

Glycyl-2-leucine dipeptidase activity from pig intestinal mucosa was determined under optimal pH conditions at 25°C using glycyl-L-leucine as substrate. Repeated gel electrophoresis of the major band after concentration showed the same distribution of protein into 3 bands. This result indicates a transformation between different forms of the enzyme occurring during the experiment, a phenomenon known from other polyacrylamide gel electrophoresis experiments. Each purification usually starts with about 90 g of lyophilized mucosa extract and yields about 2 mg of the purified glycyl-L-leucine dipeptidase. For the pooled active fractions of Sephadex G-100 effluent, volume was 38.5 ml, absorbance at 280 was 0.063, total activity was 4900 U, yield was 8.1% and the purification factor was 2060.

9176 VITAMIN D3 ACTION ON RNA SYNTHESIS IN RAT INTESTINAL MUCOSA. (E.) Iitoyo, N. (Univ. Tokyo Sch. Health Sci.), S. Moriuchi, S. Takase and N. Hosoya. *J. Vitaminol. (Kyoto)* 17(2):73-80, 1971.

9177 THE DEVELOPMENT OF SOME ENZYME ACTIVITIES IN THE GUT OF THE RAT. (E.) Hahn, P. (U. British Columbia Dept. Pediatr., Vancouver, Canada) and J. Skala. *Biol. Neonate (Basel)* 18(5-6):433-438, 1971.

9178 OXYGEN UPTAKE BY RAT JEJUNUM IN MEDIA DEVOID OF Na^+. (E.) Jordana, R. (U. Navarra Dept. Physiol., Spain) and C. Igea. *Rev. Esp. Fisiol.* 27(2):155-162, 1971.

See also number: 9147

9179 TRANSPORT STUDIES, MORPHOLOGICAL AND HISTOCHEMICAL FINDINGS IN INTESTINAL EPITHELIAL CELLS FOLLOWING MASSIVE BOWEL RESECTION. (E.) Wilmore, D. W. (U. Pennsylvania Sch. Med., Philadelphia), P. G. Holtzapple, S. J. Dudrick and J. J. Cerda. *Surg. Forum* 22:361-363, 1971.

Biopsies were taken from the duodenum, jejunum and ileum of 1-yr-old dogs that had undergone a 90%-enterectomy at 10 weeks of age. Bowel wall thickening and hypertrophy were observed in the intestinal segments that remained after resection; however, mucosal enzyme concentrations, cell ultrastructure, and the active uptake of glucose and amino acids by the epithelial cells were the same in the resected animals as in the controls. Results indicate that the enhanced absorption and functional compensation observed after intestinal resections is due to hypertrophy of the villi, which provides an increased number of cells, rather than an increase in individual cell function.

9180 CONVERSION OF ANGIOTENSIN I TO ANGIOTENSIN II IN THE CANINE MESENTERIC CIRCULATION. (E.) DiSalvo, J. (Squibb Inst. Med. Res., New Brunswick, N. J.) and C. B. Montefusco. *Am. J. Physiol.* 221(6):1576-1579, 1971.

Mongrel dogs were anesthetized with pentobarbital and an electromagnetic flow-meter was used to study flow through the superior mesenteric artery. Marked decreases in flow through this vessel were seen after intra-arterial injections of angiotensin I (0.375 to 3.75 μg) and angiotensin II (0.13 to 1.00 μg), and the reduction in flow with angiotensin II was always significantly greater than that seen with angiotensin I. The synthetic pentapeptide SQ 20475 (Pyr-Lys-Try-Ala-Pro; which blocks the enzymatic conversion of angiotensin I to angiotensin II) markedly decreased the vasoconstrictor action of angiotensin I, while, as expected, having no effect on the response to angiotensin II. Using a Lineweaver-Burke plot, it was seen that locally only about 25% of angiotensin I is converted to angiotensin II and that this local conversion is responsible for the vascular response.

9181 RECEPTORS, ACTIVATED BY ACID, IN THE DUODENAL WALL OF RABBITS. (E.) Andrews, C. J. H. (Roy. Free Hosp. Sch. Med., London) and W. H. H. Andrews. *Q. J. Exp. Physiol.* 56(4): 221-230, 1971.

Hydrochloric acid, 0.1 and 0.05 M, and acid sodium citrate, buffered with HCl to a pH of less than 2 were introduced into the duodenal lumen of anesthetized rabbits. That solution induced action potentials in the distal portions of cut maesenteric nerves coming from that aspect of the duodenum exposed to the acid. Two types of responses were noted from the upper part of the duodenum. One consisted of an intense volley of action potentials of immediate onset and short duration (15 sec); the other response was less intense, reached its maximum in 30 sec and was of longer duration (90 sec). Regarding the stimulation of these 2 receptors by acid in the lumen, the concentration of hydrogen ions seems to be the important factor. Possibly one of the receptors is a true detector of hydrogen ions, while the other receptor together with receptors from the lower doudenum could be associated with intestinal nociception.

9182 CAFFEIC ACID METABOLISM BY BACTERIA OF THE HUMAN GASTROINTESTINAL TRACT. (E.) Peppercorn, M. A. (NIH, Bethesda, Md.) and P. Goldman. *J. Bact.* 108(3):996-1000, 1971.

Evidence for the transformation of caffeic acid, dihydrocaffeic acid, and 4-vinylcatechol was observed with a mixed culture of bacteria from a small sample of human feces. Twelve organisms and one mixed culture were then isolated from fecal samples using standard techniques. Six of the isolates were obtained in the presence of caffeic acid or one of its metabolites, seven isolates were obtained independently. It was found that none of the 12 organisms isolated had the ability to catalyze more than 1 reaction from- caffeic acid to either m-hydroxyphenylproprionic acid or 4-ethylcatechol. Growth of the individual organisms was better on media that contained dihydrocaffeic acid but no dehydroxylation reaction was noted. Limiting factors for the experiment may have been selection of the media or anaerobic requirement difficulties. Two mechanisms are suggested, i.e. one organism may provide the growth conditions necessary for enzyme production by the second organism or dehydroxylation occurs in 2 steps, each step catalyzed by an enzyme present in one of the organisms. Similar mechanisms are postulated for reduction steps.

9183 SIMPLIFIED METHOD OF CANINE ORTHOTOPIC HEPATIC TRANSPLANTATION. (E.) Cooperman, A. M. (Mayo Clin., Rochester, Minn.), J. E. Woods and D. C. McIlrath. *Am. J. Surg.* 122(6):297-801, 1971.

The technique is easier and allows consistent success with a minimal number of personnel. The hepatic artery is used for the arterial anastomosis beneath the portal vein instead of the aorta. Cooling of the donor by submersion in an ice bath or peritoneal lavage with iced saline was unnecessary. The syprahepatic cava was approached by gentle lateral retraction of the liver and first freeing the posterior attachments, and the left phrenic vein need not be ligated and divided. The right hepatic vein was ligated and divided before it entered the suprahepatic cava, facilitating the upper anastomosis by allowing a longer segment of suprahepatic cava. Minimal doses of anesthesia were used, the use of phencyclidine hydrochloride permitting less sodium pentobarbital to be used. This technique has permitted 20 consecutive operative survivors. In most instances the dogs were breathing spontaneously at the end of the procedure and were awake and standing within 2-3 hr after operation. Nearly all survived until organ rejection 7-10 days after surgery.

9184 A TECHNIQUE FOR CHRONIC SUBMUCOSAL ADMINISTRATION IN THE DOG. (E.) Thomason, M. R. (Temple U. Sch. Pharm., Philadelphia, Pa.), R. S. Thompson and R. F. Gautieri. *Toxicol. Appl. Pharmacol.* 20(5):582-587, 1971.

A special cannula, modified by drilling a series of small holes around the periphery of its base, was attached to the ventral aspect of the colon using 3-0 gastrointestinal silk. Each interrupted stitch was made through one of the attachment holes in the base of the cannula and only the serosal layer of the colon. The ostium for the exteriorization of the cannula was made by means of a custom-designed surgical trochar. The cannula was exteriorized, and the midline incision was closed. Postoperative antibiotic therapy consisted of sulfanilamide, 75%: sulfathiazole, 25% powder on the incision site and the i.m. injection of 600,000 units of procaine penicillin daily for 4 days. After the postoperative period (10-14 days), the cannula was completely encapsulated by massive tissue adhesions. The serosal surface became sclerosed due to the cannula resting against it, and the stitches worked out, allowing the adhesions to stabilize the cannula.

9185 BLOOD FLOW TO THE ILEAL REMNANT FOLLOWING MASSIVE INTESTINAL RESECTION. (E.) Touloukian, R. J. (Yale U. Sch. Med., New Haven) and R. P. Spencer. *Surg. Forum* 22:370-371, 1971.

Two months after a 50% mid-enterectomy, rats had developed hypertrophied ileal remnants that were comparable in weight to the entire ileum of unoperated controls and animals having a simple transection and re-anastomosis. No hypertrophy, however, was observed in the jejunal remnant. The percentage of cardiac output received by the jejunal remnant was reduced in proportion to the extent of the resection and was half that delivered to the entire jejunum of controls. A reduction in blood flow to the ileal remnant was observed 2 days after surgery. However, after 2 months, blood flow had risen to values similar to those for the entire ileum of the unoperated and transsected controls. Mucosal blood flow to the ileum was greater than that of controls 2 days after surgery, but returned to control values within 2 months.

9186 SELECTIVE DILATION WITH PROSTAGLANDIN E_1, GLUCAGON, AND ISOPROTERENOL OF THE CONSTRICTED SUPERIOR MESENTERIC ARTERY. (E.) Treat, E. (U. Oklahoma Med. Ctr., Oklahoma City), H. B. Ulano, L. B. Shanbour and E. D. Jacobson. *Surg. Forum* 22:371-373, 1971.

When dogs were acutely bled 30% of their blood volume, mesenteric vascular resistance was increased, mesenteric blood flow was reduced by 50-75% and arterial blood pressure was decreased by 40-50%. Infusion of prostaglandin E_1, glucagon or isoproterenol into the first branch of the superior mesenteric artery for 1 hr restored blood flow to pre-hemorrhage values and reduced vascular resistance across the gut to below pre-hemorrhage values, without altering systemic arterial pressure. Infusion of dopamine or normal saline had no beneficial effect. It is suggested that patients with non-occlusive mesenteric ischemia might be treated effectively by intra-arterial infusion of vasodilator drugs.

9187 AUTOREGULATION OF PORTAL PRESSURE IN MAN. (E.) Kessler, R. E. (New York U. Sch. Med., N. Y.), D. A. Tice and D. Zimmon. *Surg. Forum* 22:351-352, 1971.

In 18 patients with cirrhosis, an extracorporeal portosystemic shunt was created by connecting an umbilical vein catheter to a saphenous vein catheter with silicone rubber tubing, incorporating a roller pump and an electromagnetic flow meter. The rate and direction of shunted flow was varied 100 ml/min and the response of portal pressure was monitored. One group of patients (50%) showed little change in portal pressure in response to large changes in umbilical-to-saphenous or saphenous-to-umbilical flow. Further clinical studies suggest that these patients, as well as normal persons, autoregulate portal pressure through compensatory changes in hepatic arterial flow. The remaining patients had steep pressure flow curves, since small flow increments resulted in large portal pressure changes. It is suggested that these patients have inadequate hepatic artery flow and develop reduction in sinusoidal perfusion after portosystemic shunting. Six autoregulatory patients underwent end-to-side portacaval shunting and all had uneventful postoperative courses. One patient with a steep pressure flow curve underwent the same procedure and had multiple episodes of hepatic failure for 3 months before recovery. It is suggested that this technique could be used to determine which patients could be successfully treated for bleeding varices by diverting portal blood from the liver.

9188 A METHOD OF REINFORCING THE MUCOSAL SEPTUM OF THE VAGALLY INNERVATED GREATER CURVATURE STOMACH POUCH USING OMENTUM. (E.) Cleator, I. G. M. (U. British Columbia Dept. Surg., Vancouver, Canada) and R. C. Harrison. *J. Surg. Res.* 11(11):545-549, 1971.

Innervated gastric pouches were made along the greater curvature in 18 dogs using the classical technique of Hollander and Jemarin in 9, and the same technique with reinforcement of the mucosal septum with omentum in the other 9. Breakdown of the septum usually occurred between the fourth and tenth day, and was demonstrated by the presence of large amounts of acid and food in the pouch collections. Using Hollander and Jemarin's method alone, 8 of 9 dogs developed septal breakdown and the remaining dogs developed dehiscence of the main wound and died 1 week after surgery. When the septum was reinforced with omentum, 2 dogs developed septal breakdown and the other 7 had intact pouches on testing. The insulin tests on these 7 dogs were all strongly positive. Thus, reinforcement of the septum with omentum seems helpful in this procedure.

9189 SECTION OF THE VAGUS NERVE AT THE LEVEL OF THE HEPATIC PLEXUS AND ITS EFFECTS ON CHOLEDOCHAL PRESSURE. (Sp.) Suárez Savio, O. (Joaquin Albarran Hosp., Havana, Cuba), A. Fragoso, F. Silió, A. Arronde, E. Febles and C. Callejas. *Rev. Cub. Cir.* 10(2):163-170, 1971.

In dogs, section of the right vagus nerve at the level of the hepatic plexus induced an immediate, sharp decrease of pressure in the common bile duct, which was greater than the maximal decrease induced in controls by i.v. administration of atropine. In the operated animals, i.v. injection of morphine (in quantities sufficient to induce spasm of the sphincter of Oddi, in controls) resulted in only slight increase of choledochal pressure, equal to approximately one-third the amount of the decrease induced by vagal section. It is concluded that the technique might have practical, clinical applications.

9190 THE VASCULAR ESCAPE PHENOMENON IN THE INTESTINAL CIRCULATION AND ITS INDUCTION BY ESSENTIALLY DIFFERENT VASOCONSTRICTING AGENTS. (Ger.) Henrich, H. (U. Wurzburg Physiol. Inst., Germany) and J. Lutz. *Pfluegers Arch.* 329(1): 82-94, 1971.

In rats treated by intra-arterial infusion by way of the superior mesenteric artery, quantitatively and qualitatively comparable, autoregulatory escape reactions were induced in the intestinal vascular system by epinephrine, norepinephrine, 2-ethylamino-1-(3-hydroxy)phenyl HCl (Effortil), angiotensin II (Hypertensin), vasopressin and prostaglandin $F_{2\alpha}$. It is concluded that the escape phenomenon was not dependent upon the presence of specific (adrenergic) receptors, particular functional structures, or secondary dilatation induced by the catecholamines.

9191 EFFECTS OF INTRAARTERIAL CATECHOLAMINE INFUSIONS ON BLOOD FLOW IN THE CANINE GUT. (E.) Swan, K. G. (Walter Reed Army Inst. Res., Washington, D. C.) and D. G. Reynolds. *Gastroenterology* 61(6):863-871, 1971.

Intra-arterial infusions of epinephrine, norepinephrine, pnenylephrine, and isoproterenol were administered to dogs, and superior mesenteric blood flow was measured using an electromagnetic blood flowmeter. Infusion of epinephrine or norepinephrine (0.5 μg/kg/min) caused a significant decrease in mesenteric blood flow within 1 min, but blood flow then increased progressively despite continued drug infusion. This escape occurred more rapidly and its magnitude was greater with epinephrine. Adrenergic receptor blockage attenuated the vasoconstrictor response to norepinephrine and caused vasodilation with epinephrine. Whereas phenylephrine infusion caused vasoconstriction, isoproterenol infusion was followed by vasodilatation, neither of these amines showing the overshoot seen with epinephrine and norepinephrine. A β adrenergic blockade inhibited the autoregulatory escape from epinephrine and norepinephrine. Norepinephrine and phenylephrine increased mean arterial pressure by 7 and 5 mm Hg, resp.; isoproterenol decreased mean arterial pressure by 10-11 mm Hg, and epinephrine was without effect on arterial pressure. Norepinephrine, epinephrine, and isoproterenol each increased portal venous pressure significantly within 3 min. Thus, the effects of epinephrine and norepinephrine on the gut may be moderated by autoregulatory phenomena.

9192 MICROCIRCULATION OF THE BILE PASSAGES. (Fr.) Aires De Sousa, L. (U. Lisbon Sch. Med., Portugal), H. Rodrigues, C. Miranda and A. Cruz. *J. Belge Radiol.* 54(5):597-601, 1971.

9193 HEPATIC ARTERIES ACCORDING TO DATA OF INTRAVITAL SELECTIVE ARTERIOGRAPHY. (Rus.) Klimenko, G. A., A. M. Levendiuk and I. L. Shalikov. *Vestn. Khir.* 107(7):34-38, 1971.

9194 THE CHARACTERISTICS OF THE BLOOD SUPPLY IN THE AUXILIARY LIVER TRANSPLANTATION. (E.) Dagradi, A. (Inst. Radiol., Verona, Italy), G. F. Pistolesi and F. Frasson. *Roentgenblatter* 24(9):483-484, 1971.

9195 PANCREATIC HYPERVASCULARIZATION. (Fr.) Bennet, J. (CHU St. Antoine, Paris), R. Bigot and J. P. Monnier. *J. Radiol. Electrol. Med. Nucl.* 52(8-9):485-488, 1971.

9196 CARBOXYANGIOGRAPHY IN THE EXPLORATION IN THE INFRAHEPATIC VEINS. (Fr.) Bendib, M. (CHU Radiol. Clin., Alger, Algeria), M. Toumi and A. Boudjellab. *J. Radiol. Electrol. Med. Nucl.* 52(8-9):544, 1971.

9197 CRITICAL ANALYSIS OF THE SERUM GLUCOSE - AMYLASE TEST, BASED ON FIFTY-FIVE TEST RECORDS INTERPRETED IN THE LIGHT OF A NUMBER OF QUANTITATIVE CRITERIA. (Fr.) Chariot, J. (Bichat Hosp., Paris), B. Gouin, J. de la Tour and C. Debray. *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):199-210, 1971.

Ermini's serum glucose-amylase test (involving hyperglycemia induced by p.o. administration of glucose) was administered to 3 groups of hospitalized subjects, including 10 normal controls, 22 patients with pancreatic disorders (15 of 22, chronic or subacute pancreatitis; 4 of 22, suspected pancreatitis; 3 of 22, cancer of the pancreas) and 23 patients with other disorders, who were free of pancreatic involvement. In addition, repeated determinations of serum lipase were made in all subjects, and "pseudo-tests," without ingestion of glucose, were performed in a total of 10 subjects, drawn at random from the 3 groups. As compared to the 2 other groups, patients with pancreatic disorders showed significantly increased pre-test serum levels of both amylase and lipase. No other significant differences could be demonstrated as between the 3 groups or combinations of subgroups: in terms of mean maximal or mean hourly variations of serum amylase or serum lipase, similar variations of glycemic levels, or any of the possible relationships between these 3 parameters. It is concluded that the test had no clinical value.

9198 COLONOSCOPY. A STUDY OF 50 CASES. (E.) Kuld Hansen, L. (Copenhagen County Hosp., Hellerup, Denmark). *Scand. J. Gastroenterol.* 6(8):687-691, 1971.

The results of colonoscopies performed in 50 patients using a long (20 mm) colonoscope are reported. Whereas in all 19 cases of infectious disorders it was possible to make the diagnosis by colonoscopy, X-ray showed normal conditions in 5 cases. Of 16 patients with tumor formation, the colonoscope failed in 3. In the group without pathological changes (15 cases), colonoscopy failed in 2 cases. Thus, endoscopy was successful in 45 of 50 cases. In 44% of the cases (22) the colonoscope was inserted into the ascending colon. The main causes of incomplete insertion were stricture, diverticulitis and growing sigmoid loop. The average duration of the examinations was 38 min overall, and 54 min where the ascending loop was reached. Serious complications such as perforation or bleeding did not cccur. Thus, the colonoscope revealed more positive results concerning infectious lesions and smaller polyps than the X-ray examination. Thus, colonoscopy is helpful in excluding false positive X-rays; however, X-ray examination is still necessary for the best possible diagnostic accuracy.

9199 ACCURATE ASSAY OF LOW INTESTINAL LACTASE ACTIVITY WITH A FLUOROMETRIC METHOD. (E.) Dahlqvist, A. (Univ. Hosp., Lund, Sweden) and N.-G. Asp. *Anal. Biochem.* 44(2):654-657, 1971.

Generated NADH was measured with a filter fluorometer with a 1° and 2° filter. The hydrolysis of lactose was carried out at pH 6 and the coupled reaction at pH 8.6, which is optimum for the galactose dehydrogenase. Suitable reaction rates were provided at room temperature by 50 μg of galactose dehydrogenase, giving a plateau within 15 min. NAD^+ was not a limiting factor of the reaction when present in a concentration of 1 mg. A linear relation was obtained with 2-160 μg mucosal protein in the incubation mixture, yielding 0,02-1% hydrolysis of the lactose. This assay is 5 times more sensitive than the ultramicromodification of the glucose oxidase method, and is not influenced by high concentrations of mucosal homogenate in the incubation mixture.

9200 AN OXYGENATION-PERFUSION METHOD FOR IN VITRO TRANSPORT STUDIES ON THE INTESTINES OF LARGE MAMMALS. (E.) Whitten, E. H. and R. W. Phillips (Colorado State U. Dept. Physiol. Biophys,, Fort Collins). *Am. J. Dig. Dis.* 16(10):915-919, 1971.

A technique for oxygenation-perfusion for in vitro transport studies on the intestines of large animals which provides for thorough mixing and controlled rate of flow, and assures viability of the tissue for a reasonable experimental time is presented. The apparatus provides for separate systems bathing the inner (mucosal) and outer (serosal) surfaces of the tissue with Krebs-Ringer solution, with the oxygenation and flow rate of each bathing solution being controlled. Whereas the circulation rate of the mucosal solution is controlled by a peristaltic pump, the serosal solution can be circulated by another pump or constantly mixed by gas pressure. The technique was successful in quantitating the net directional transport of electrolytes and water across the intestinal wall of normal versus diarrheic neonatal calves. Microscopic examination of 33 intestinal segments at the end of 75 min of experimentation revealed no visible damage or alteration of the epithelial cells or their microvilli, nor any derangement of the lamina propria or submucosal layers.

9201 INTRAHEPATIC PRESSURE MEASUREMENT: SOME PITFALLS. (E.) Pétursson, M. K., J. Wenger (Atlanta VA Hosp., Ga.), M. S. Landy, I. S. Crawley and J. Lindsay. *Scand. J. Gastroenterol.* 6(8):745-750, 1971.

Intrahepatic and wedged hepatic venous pressures were measured simultaneously and sequentially in 2 groups of 11 patients with liver disease. When the 2 procedures were done simultaneously, the difference between intrahepatic and wedged hepatic venous pressure was 3 mm Hg or less in 9 of 11 patients, the average difference being 0.55 mm Hg. When the 2 measurements were made sequentially, the intrahepatic pressure was on the average 6.82 mm Hg lower than the wedged hepatic venous pressure. Aside from postoperative pain at the entry site, no complications occurred from the percutaneous liver puncture. Intrahepatic pressure did not prove to be a reliable method of estimating portal pressure in these patients.

9202 MODIFICATION OF THE THREE-CHANNEL, DOUBLE BALLOON SOUND FOR SECURING SAMPLES OF HEPATIC AND PANCREATIC SECRETIONS, PERMITTING SIMULTANEOUS STUDIES OF INTESTINAL RESORPTION AND ENTEROHEPATIC CIRCULATION. (Ger.) Klapdor, R. (U. Hamburg 1st Med. Clin., Germany) and H. Bartelheimer. *Klin. Wochenschr.* 49(21): 1186-1187, 1971.

A modification of the conventional Bartelheimer, 3-channel, double-balloon sound permits both balloons to be inflated simultaneously, through a single channel. A second channel opens between the balloons, as previously, while a third opens 5 cm behind the lower balloon. After removing the amount of siphoned duodenal content which is required for a particular study, it is possible to return the remainder to the small intestine, distal to the second balloon, with subsequent, postduodenal, rapid transport of the returned material to the lower jejunum and the ileum. The technique is said to be of value in studies of intestinal resorption, studies of the effect on hepatic and pancreatic secretions of substances introduced postduodenally into the small intestine, and studies of such secretions with or without interruption of enterohepatic circulation.

9203 INVESTIGATION OF MAJOR SALIVARY DUCT OBSTRUCTION BY SEQUENTIAL SALIVARY SCINTIGRAPHY. REPORT OF 3 CASES. (E.) Schall, G. L. (U. California Med. Ctr., San Francisco), L. G. Anderson, J. S. Buchignani and R. O. Wolf. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(4): 655-659, 1971.

While all 3 cases showed obstruction of Stensen's duct, only 1 had evidence of Sjögren's syndrome, one had rheumatoid arthritis and xerostomia, but no histologic or functional abnormalities associated with Sjögren's syndrome, and the third had no evidence of xerostomia or Sjögren's syndrome, but gave a history compatible with right parotid obstruction. In all 3 cases sequential salivary scintigraphy confirmed the findings of the sialogram, the latter technique having inherently greater resolution. However, in certain instances where the use of contrast sialography is contra-indicated, as in patients with a history of hypersensitivity to contrast material or those with suppurative or other acute parotidites, sequential scintigraphy may prove satisfactory in providing a gross estimation of duct patency.

9204 SEPHADEX ADSORPTION OF BILIRUBIN FROM NEONATAL AND ADULT SERUM. (E.) Kapitulnik, J. (Hebrew U.-Hadassah Med. Sch., Jerusalem), S. H. Blondheim and N. A. Kaufmann. *Clin. Chem.* 18(1):43-47, 1972.

At high serum bilirubin concentrations Sephadex absorbed bilirubin from both cord blood and adult serum, and the columns were tinted yellow. The bilirubin adsorbed at these levels (but not at lower concentrations), as measured by the absorbance at 450 mm of the chloroform extract of NaOH eluates was linearly related to the bilirubin concentrations of the solutions applied to the columns. Bilirubin-binding capacity of albumin in serum from cord blood was less than that of adult serum. The binding site at which bilirubin was tightly bound by albumin in pools of infant serum was saturated at an average bilirubin/albumin molar ratio of 0.66, while in adult serum the ratio was 1:00. As bilirubin concentration increased, albumin of infant serum bound bilirubin was less than that of adult serum. This might provide a further explanation for the frequency of bilirubin encephalopathy in the neonatal period and its rarity thereafter.

9205 A FEASIBILITY STUDY OF SPLENOHEPATOGRAPHY WITH TANTALUM METAL AND TANTALUM PENTOXIDE. (E.) Gianturco, C. (U. Illinois Dept. Physiol. Biophys., Urbana), B. Ruskin, F. R. Steggerda and T. Takeuchi. *Radiology* 102(1): 195-196, 1972.

The effectiveness of tantalum metal and tantalum pentoxide as contrast media for splenohepatography was evaluated in dogs and rabbits. Dextrin-tantalum suspension was injected i.v. to give 1.5 g of metallic tantalum per kg body weight. The i.v. injection of metallic tantalum powder in this manner was capable of demonstrating the liver and spleen, but was determined to be too dangerous for clinical or experimental use. Suspensions of tantalum pentoxide in distilled water and dextrin were injected i.v. to give 1.5 g of Ta_2O_5/kg body weight. Excellent splenohepatograms were obtained. All dogs remained in excellent health until sacrifice 5 months after injection. Using an ultrafine Ta_2O_5 powder (about 0.1 µ particle size) did not prevent the formation of the hepatic and renal emboli which were observed in these animals.

9206 AUTOMATED PROCEDURE FOR DETERMINATION OF BILIRUBIN IN HUMAN SERA. (E.)

Cooper, J. D. H. (Coventry Warwickshire Hosp., Coventry, England). *Clin. Chem.* 17(12):1180-1182, 1971.

The Bruchner method, with an additional stabilization with formamide and cyanide, for serum bilirubin analysis was adapted for use on the autoanalyzer. The effects of hemoglobin and lipemia were investigated for possible interference. The mean of 50 sera by the Bruchner method was 1.95 mg total bilirubin per 100 ml; the mean for the autoanalyzer was 1.99 mg per 100 ml. Correction could be made for the addition of as much as 500 mg of hemoglobin per 100 ml and determinations of blanks, total, and unconjugated bilirubin in sera could be determined by the automatic method. Lipemic sera could not be cleared completely and blank determinations must be made. This method has been used satisfactorily by the author's laboratory for longer than 6 months. Within batch precision was found to give a standard deviation (SD) of 0.13 mg% for total bilirubin and a SD of 0.10 mg% for conjugated bilirubin. The between batch precision had a SD of 0.18 mg% for total bilirubin and a SD of 0.12 mg%.

9207 DUODENOSCOPY: METHODS AND FINDINGS. (E.) Classen, M. (U. Erlangen-Nuremberg Dept. Med., Germany), H. Koch and L. Demling. *Gastrointest. Endosc.* 18(2):78-80, 1971.

Balboscopy, as a component of the combined endoscopic examination of the esophagus, stomach, and upper duodenum has been carried out 601 times in 492 patients. Indications for the procedure were in emergency endoscopy for upper digestive tract bleeding, in cases of radiologically detected change in any of the above 3 organs, and in cases of retrosternal and epigastric complaints without radiological findings. In 18 of 41 emergency endoscopic examinations using the combined method of esophagogastro-bulboscopy, the source of hemorrhage was discovered only after bulboscopy. In 7 cases the source of hemorrhage could not be detected. Thirty-eight of 114 duodenal ulcers were detected only with endoscopy. Simultaneously occurring lesions were diagnosed definitely by endoscopy and, in this series, occurred in 12.4% of the patients. Side viewing systems with selective contrast medium instillation into the biliary duct system is superior to conventional radiologic methods. Techniques are described for visualization of the ampulla of Vater and a 90% success rate is described for cannulation and demonstration of abnormalities in the pancreas and biliary tract. Retrograde cholangiography offers the most difficulties.

9208 COLOR TELEVISION GASTROSCOPY: A CRITICAL ANALYSIS. (E.) Rider, J. A. (Franklin Hosp., San Francisco, Calif.), E. J. Puletti, R. D. Rider and P. N. Colombini. *Gastrointest. Endosc.* 18(2):66-68, 1971.

The use of color television to produce endoscopic images approaches the ideal for projecting these images. Closed circuit color television of the stomach is dependent on a safe, flexible fiberendoscope containing a fiberoptic light conduction bundle which supplies sufficient internal illumination and an increased sensitivity of the color camera. The entire unit, which costs $70,000, is described in detail and can be operated by the endoscopist and a technician. The endoscopic exam can be shortened because teaching and consultation can occur at a later time or unlimited viewers may observe the initial exam. The patient is also spared open discussion of the findings at the time of the exam. Disadvantages include the time delay between taking the film and developing it and the possibility of film of poor quality. Adequate mobility is provided to the endoscopist, who is not as hampered as in ordinary clinical examinations.

9209 ROUTINE DETERMINATIONS OF SERUM PEPSINOGENS. (E.) Lombarts, A. J. P. F. (St. Canisius Hosp., Nijmegen, Netherlands) and H. J. Peters. *Clin. Chim. Acta* 36(1):195-200, 1972.

This method of serum pepsinogen determination uses the serum proteins themselves as substrates and follows a modification of the method of Uete. Values are expressed as amount of tyrosine-like products released under standard conditions. The results provide at least as much and as reliable information as the presently used methods of determining free and total acids after pentagastrin stimulation. Advantages of the serum pepsinogen assay include results that are more reproducible and independent of patient variables; less unpleasant for the patient, and much less time consuming. Best results were obtained in serum of pH 2.0 and electrophoretically distinct pH-dependent human pepsinogens could not be demonstrated. The average pepsinogen content in 16 duodenal ulcer patients was considerably higher when compared with 28 normal patients, whereas in 9 pernicious anemia and achylia gastrica patients the average was lower. Overlaps did occur but were not worse than those seen in gastric acid analyses and provided the same amount of information.

9210 ABDOMINAL AND RETROPERITONEAL SONOGRAPHY. (E.) Templeton, A. W. (U. Kansas Med. Ctr., Kansas City) and J. L. Stuber. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(4): 741-748, 1971.

Sonography which utilizes ultrasound with frequencies of 2-10 million cycles/sec, has been used in the diagnosis of various intraabdominal and retroperitoneal problems. Over 250 sonographies were performed over a period of 9 months and proved to be complementary to many of the established isotope and roentgenographic examinations. Sonography utilizes a wave generated by a lead zirconate crystal with piezoelectric properties and measures change in ultrasound wave velocity at a tissue interface that is recorded on a storage oscilloscope. Sonography has become useful for evaluating renal masses, for differentiating multicystic kidney disease, hydronephrosis, transplant rejections, clot-filled aneurysms, mapping the extent of lymph node involvement in Hodgkin's disease and in obscure cholelithiasis. This series found evaluation of the liver by sonography to be relatively nonrewarding but found sonography to be the procedure of choice in evaluating the pancreas. Various image patterns that characterize the disease are presented. No adverse effects have been identified at the energy levels used in diagnosis and sonography has the advantage of no radiation effects.

9211 A SURGICAL PROCEDURE FOR DETERMINING THE BOUNDARIES OF THE GASTRIC ANTRUM BY MEASURING INTRAGASTRIC pH. (Sp.) Naveiro, J. J. (Jose Maria Ramos Mejia Municipal Hosp., Buenos Aires, Argentina), P. S. Briones, L. J. Barsdorf, C. A. Linares and C. J. Morel. *Acta Gastroenterol. Lat. Am.* 2(3):143-148, 1970.

When a hollow acrylic tube containing a pH electrode was introduced into the stomachs of dogs, following a 2-cm gastrotomy performed on the anterior surface, no significant differences were found in non-medicated animals, as between the pH of the antrum and that of the fundus. When pH was measured 15-20 min after stimulation of gastric secretion by histamine HCl (0.25 mg/kg, s.c.), administered 30 min after N-dimethylaminoethyl-N-p-chlorobenzyl-α-aminopyridine HCl (20 mg), the alkaline mucosa of the antrum was clearly delineated from the acid mucosa of the fundus, as confirmed by postmortem histologic studies.

9212 CATHETERIZATION OF THE AMPULLA OF VATER DURING ENDOSCOPIC EXAMINATION OF THE DUODENUM. (Fr.) Jeanpierre, R. (Res. Group Dig. Nutr. Physiopathol., Nancy, France), J. Laurent, M. Bas, J. Fays, R. Dornier, M. Bigard, F. Vicari, P. Gaucher, F. Heully and M. Merle. *Arch. Fr. Mal. App. Dig.* 60(10-11):525-534, 1971.

A technique for catheterizing the ampulla of Vater under general anesthesia or neuroleptic-induced analgesia is described in detail. The procedure permits retrograde opacification of Wirsung's canal and the common bile duct without surgery. A special fibroduodenoscope is required, which is also described in detail. With experience, the technique is successful in 90% of the cases in which it is attempted.

9213 PRESENT STATUS OF THE SECRETIN TEST. (E.) Jacobs, W. H. (Menorah Med. Ctr., Kansas City, Mo.), T. Chaudhuri and L. I. Pickering. *Mo. Med.* 69(1):33-35, 1972.

Repeat secretin tests were performed on the same patient using the same (Boots) or different (Boots and GIH) brands of secretin. Using Boots' secretin only, in 6 of 20 patients subnormal bicarbonate response in the first test became normal in the second test; in 2 patients the opposite occurred. Although there was evidence of pancreatic disease in 6 patients, not one had evidence of chronic pancreatitis, the diagnosis usually indicated by subnormal bicarbonate concentration. A subnormal volume was seen in 7 subjects in the first test that became normal in the second; 2 had chronic pancreatitis and 5 were normal. GIH secretion caused a greater volume of pancreatic secretion, but not necessarily a higher bicarbonate concentration. The lower values accepted as normal must be reduced; whereas, a minimal value of 2 ml/kg is acceptable after GIH secretion, a volume of 1.5 ml/kg is satisfactory after Boots' secretion. Maximal bicarbonate concentrations as low as 70 mEq/l may be observed in healthy patients in response to either brand. The test should be repeated in borderline cases, using 4 U/kg of Boots' or 0.9 U/kg of GIH secretin.

9214 DETERMINATION OF SMA-MARK $X^1,^2$ SET POINTS FOR BILIRUBIN BY STANDARD ADDITION TECHNIQUE. (E.) Laessig, R. H. (U. Wisconsin State Lab. Hyg., Madison), T. H. Schwartz and T. A. Paskey. *Clin. Chem.* 18(1): 48-51, 1972.

A technique based on the standard addition method is described for calibration of the bilirubin channel on the SMA and Mark X analytical systems. The current technique provides any laboratory a means of checking the validity of set point for bilirubin for those who cannot rely on an elaborate set of 10 or 12 reference quality procedures. It provides an automatic check on linearity of instrumental response. The use of a set of standards to plot a line with subsequent determination of set-point from the least-squares slope rather than from a single point tends to minimize the errors owing to the precision limitations of instruments and laboratory techniques. Its direct applicability to the nonenzymatic systems may be presumed.

9215 A COMPARISON BETWEEN PHENOL RED AND ^{51}Cr EDTA AS REFERENCE SUBSTANCES IN RATS BY A TEST MEAL TECHNIQUE. (E.) Kristoffersen, J. (Vet. Coll. Norway, Oslo) and P. Lokken. *Acta Pharmacol. Toxicol. (Kbh.)* 30(1-2):97-103, 1971.

9216 TECHNIQUE OF TRANSANAL SMALL BOWEL BIOPSY. (Ger.) Siebner, H. (Marien Hosp., Hamburg, Germany) and H. P. Missmahl. *Dtsch. Med. Wochenschr.* 96(36):1450, 1971.

9217 THE DIFFERENTIAL DIAGNOSIS OF GASTROINTESTINAL HEMORRHAGES. A CASE REPORT. (Ger.) Gregori, P. (Dist. Hosp., Schleiz, Germany). *Dtsch. Gesundheitsw.* 26(37):1729-1730, 1971.

9218 Se^{75} SELENOMETHIONINE IN SCINTISCANNING OF THYROID AND HEPATIC LESIONS. (Sp.) Maisterrena, J. A. (Natl. Inst. Nutr., Mexico City, Mexico), E. Tovar, A. Cervantes and C. Tello. *Rev. Biol. Med. Nucl.* 3(1):18-24, 1971.

9219 REPORT ON THE RESULTS OF COMPLEX RADIOLOGIC DIAGNOSIS OF THE PERITONEAL AND EXTRAPERITONEAL SPACE IN THE UPPER ABDOMEN (CONVENTIONAL X-RAY, ANGIOGRAPHY AND ISOTOPE STUDIES). (Ger.) Munster, W. and D. Lucas. *Radiol. Diagn. (Berl.)* 12(2):181-187, 1971.

9220 TRIGLYCERIDE TEST OF HEPATIC FUNCTION. (Pol.) Krygier, T. (CMKP Clin. Gastroenterol. Metabol., Warsaw, Poland). *Pol. Tyg. Lek.* 26(35):1349-1351, 1971.

9221 CHOLANGIOGRAPHY BY EXTRAPERITONEAL PUNCTURE OF THE LIVER. (Fr.) Grelet, P. *Bordeaux Med.* 4(7-8):2169-2170, 1971.

9222 GASTROSCOPIC CINEMATOGRAPHY BY MODIFIED FIBERGASTROSCOPE. (Hun.) Wittman, I. and I. Bereti. *Orv. Tech.* 9(2):47-48, 1971.

9223 SUBTRACTION SIALOGRAPHY: AN IMPROVED AND SIMPLIFIED TECHNIQUE. (E.) Buchignani, J. S. (NIH, Bethesda, Md.) and P. M. Shimkin. *Oral Surg.* 31(6):828-830, 1971.

9224 LIVER, PANCREAS AND PARATHYROID SCINTISCANS FOLLOWING ^{75}Se METHIONINE UPTAKE IN ENTEROCYTOPLASTY. (It.) Alberti, C. (U. Parma Ist Inst. Gen. Clin. Surg., Italy), G. Ugolotti and S. Morosini. *Minerva Chir.* 26(18): 1024-1028, 1971.

9225 THE CONTRIBUTION OF SELECTIVE ARTERIOGRAPHY IN THE DIAGNOSIS OF LESIONS OF THE DIGESTIVE TRACT OF SURGICAL INTEREST. (It.) Colombo, P. (U. Pavia Inst. Gen. Clin. Surg., Italy), P. Borri and R. Rodolico. *Minerva Chir.* 26(10):562-570, 1971.

9226 A METHOD USING A DIGITAL COMPUTER FOR REDUCING RESPIRATORY ARTIFACT ON LIVER SCANS MADE WITH A CAMERA. (E.) Oppenheim, B. E. (U. Chicago, Ill.). *J. Nucl. Med.* 12(9):625-628, 1971.

9227 FURTHER OBSERVATION ON ^{131}I ROSE BENGAL CLEARANCE IN GILBERT'S DISEASE. (E.) Lull, R. J. (William Beaumont Gen. Hosp., El Paso, Tex.). *J. Nucl. Med.* 12(8):578-579, 1971.

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9229 FIBERSCOPY UNDER RADIOSCOPIC AND INTRAGASTRIC INJECTION OF UROGRAPHIN. (Ger.) Marner, I. L. *Fortschr. Endosk.* 2:193-199, 1970.

9230 THE RADIOLOGY CORNER. GASTROINTESTINAL RHABDOMYOSARCOMA. (E.) Marshak, R. H. (Mt. Sinai Sch. Med., New York, N. Y.), M. Ruoff and A. E. Lindner. *Am. J. Gastroenterol.* 56(6): 555-558, 1971.

9231 NOMOGRAMS FOR DETERMINATION OF ACID CONCENTRATION AND QUANTITY OF ACID IN GASTRIC JUICE. (Ger.) Kahl, H. (Reg. Hosp., Magdeburg, Germany), H. J. Lorenz and W. Forschner. *Z. Gesamte Inn. Med.* 26(14):459-462, 1971.

9232 TECHNIC OF FRACTIONAL ACIDIMETRIC STUDY OF THE GASTRIC JUICE WITH MAXIMAL STIMULATION AND CONTINUOUS ASPIRATION IN OUTPATIENT PRACTICE. (Ger.) Stielow, W. (Dist. Polyclin., Gadebusch, Germany) and R. Thimm. *Z. Aerztl. Fortbild.* 65(13):665-667, 1971.

9233 GALACTOSE METABOLISM AND THE GALACTOSE TOLERANCE TEST OF HEPATIC FUNCTION. (Dut.) De Vos, M. (Natl. U. Acad. Hosp., Ghent, Belgium) and L. Demeulenaere. *Tijdschr. Geneeskd.* 27(19):967-971, 1971.

9234 BLOOD PANCREATIC ENZYMES IN THE BLOOD OF PATIENTS WITH SOME DISEASES OF THE ALIMENTARY TRACT AND ITS VARIATIONS DURING UHF TREATMENT. (Rus.) Korepanov, A. M. *Ter. Arkh.* 43(6):45-48, 1971.

9235 COMPLEX ASSESSMENT OF ENTEROBIOPSY DATA IN THE DIAGNOSIS OF CHRONIC ENTEROCOLITIS. (Rus.) Fedotova, O. I. *Ter. Arkh.* 43(6):41-44, 1971.

9236 LIVER SIGNS IN HYPERTHYROIDISM (REPORT OF 19 CASES). (Fr.) Bourel, M. (INSERM, Rennes, France), B. Ferrand and N. Murie. *Sem. Hop. Paris* 47(28):1860-1872, 1971.

See also numbers: 9240, 9302, 9313, 9338, 9343, 9374, 9455, 9559, 9605, 9607, 9639, 9656, 9663, 9670, 9674, 9695, 9733, 9869

GASTROINTESTINAL DISEASES

ESOPHAGUS

9237 MANNOMETRIC STUDIES IN CHILDREN, BEFORE AND AFTER OPERATION FOR HIATAL HERNIA. (Ger.) Willich, E. (Univ. Pediatr. Clin., Heidelberg, Germany). *Z. Kinderchir.* 10(3/4): 333-344, 1971.

As compared to 28 normal infants, aged 5 days to 7 months, 46 children (aged 3 weeks to 11 yr) with fixed or sliding hiatal hernia (with or without fixation of the lower esophagus in the thorax) showed a significantly decreased, mean pressure reading in the distal portion of the esophagus. No significant difference was found in the mean pressure reading obtained for 34 children (age 3 months to 15 yr), after surgical correction of similar hiatal hernias. Among 14 children, for whom such studies were made both pre- and postoperatively, there was no significant difference between the mean values obtained. It is concluded that the "pressure barrier" in the terminal esophagus may facilitate closure but does not prevent gastroesophageal reflux of itself.

9238 SYNCOPE INDUCED BY DYSPHAGIA. CORRECTION BY ESOPHAGEAL DILATATION. (E.) Tolman, K. G. (U. Utah Med. Ctr., Salt Lake City) and W. D. Ashworth. *Am. J. Dig. Dis.* 16(11):1026-1031, 1971.

A case of esophageal stricture in association with cardiac syncope and its reversibility with esophageal dilation is reported. A vagal reflex mechanism of syncope in this 45-yr-old male patient was strongly suggested since bradycardia and syncope occurred instantly and consistently after food stuck in the esophagus. The efferent pathway was probably the vagus nerve as well, since bradycardia followed dysphagia, the symptoms were reproduced by carotid message and both were inhibited by atropine. The patient never demonstrated complete heart block. The rarity of similar reports in view of the number of patients with esophageal stricture indicate a probable abnormal response by this patient, the variable being the reflex arc.

9239 SCLEROSIS OF ESOPHAGEAL VARICES. TREATMENT AND FOLLOW-UP OF 66 PATIENTS. (Fr.) Pinel, J., R. Richard, T. Dentan, J. Trotoux and L. Leger (Cochin Hosp., Paris). *Presse Med.* 79(40):1739-1741, 1971.

Esophageal varices were sclerosed by multiple injections of a 5% solution of an unspecified mixture of quinine and urea (or quinine lactate and urea lactate) hydrochlorides, in 68 hemorrhage-prone patients in whom portacaval shunt was contraindicated in the presence of cavernoma (6 of 68) or cirrhosis of the liver (62 of 68). Treatment was repeated in the presence of subsequent hemorrhaging. At the time of report, 2 patients had failed to complete an initial course of treatment, 13 had been lost to follow-up (7 of 13, after survivals of more than 1 yr), 29 were dead (15 of 29, after survivals of 2-6 yr), 22 were surviving after intervals of 1-5 yr and 2 were surviving after intervals of less than 1 yr. Among the survivors, 14 of 24 had experienced no recurrence of hemorrhage. In all, 41 of 66 who completed an initial course of treatment survived more than 1 yr, in contrast to a recently reported mortality rate (for cirrhotic patients) of 60-70% during the first yr after a gastrointestinal hemorrhage.

9240 ESOPHAGEAL ROENTGENOGRAPHY USING TANTALUM PASTE. (E.) Dodds, W. J. (Med. Coll. Wisconsin, Milwaukee), P. S. McGlaughlin, H. I. Goldberg and T. G. Dehn. *Radiology* 102(1): 204-206, 1972.

The effectiveness of tantulum paste preparations in esophageal roentgenography was evaluated in 10 subjects with evidence of esophageal disease and 6 with portal hypertension and esophageal varices. To demonstrate mucosal coating, spot fibers were obtained after peristalsis had stripped the bulk of the contrast medium bolus into the stomach. Additional roentgenograms were obtained after 2 swallows (8 ml each) of water. The tantulum paste preparations resulted in esophagograms of excellent mucosal detail in all 16 patients. The paste coated the mucosa for 10 min or longer and was not readily washed off by the water. In the 6 patients with portal hypertension the esophageal varices were shown well. Tantulum adhered firmly to the esophageal lining, permitting prolonged fluoroscopic and roentgenographic examination of mucosal detail.

9241 THE ESOPHAGO-GASTRIC JUNCTION AS EVALUATED BY GASTROSCOPY, ESOPHAGEAL MANOMETRY, AND ROENTGENOGRAPHY. (E.) Roling, G. T. (Naval Hosp., Philadelphia, Pa.), E. L. Burke, D. O. Castell and T. A. Egleston. *Gastrointest. Endosc.* 18(2):63-65, 1971.

The esophagogastric junction of 27 patients and 2 volunteers was studied by barium swallow, esophageal manometry, and by the retroflexed gastroscope and the correlation between the 3 procedures then analyzed. There was agreement between endoscopic findings and barium swallow in only 19 of the 29 patients. There was endoscopic and manometric correlation in 21 of the 29 patients. A patulous appearance of the esophagogastric junction as visualized by the retroflexed gastroscope did not correlate with the presence of an hiatal hernia; but an esophageal sphincter pressure less than 10.5 mm of mercury correlated with positive gastroscopic findings. A hiatal hernia can be present with a competent sphincter or a large hiatal hernia pouch can be mistaken for a competent sphincter. Small sliding hernias are best demonstrated by rigorous examination by a trained radiologist utilizing the water siphon test or a bolster under the abdomen. Variations in barium swallow findings were noted between residents and staff radiologists.

9242 PHARMACOLOGICALLY ENHANCED VISUALIZATION OF ESOPHAGEAL VARICES BY PRO-BANTHINE. A PRELIMINARY REPORT. (E.) Dalinka, M. K. (Harvard Med. Sch., Boston, Mass.), E. H. Smith, R. D. Wolfe, D. Goldenberg and D. E. Langdon. *Radiology* 102(2):281-282, 1972.

Subjects consisted of 17 patients with clinical histories suggestive of esophageal varices with negative or equivocal findings on conventional barium esophagrams. After the conventional study they received 30 mg of propantheline bromide either i.m. or i.v., with cessation of esophageal motility usually within 1-2 min. after which a thick barium mixture was administered followed by multiple spot-films in both supine oblique projections. By this method, unequivocal esophageal varices were demonstrated in 9 of the 17. Three of the positive cases were confirmed by esophagoscopy and 2 patients underwent shunting procedures after confirmation by arterial portography. One negative study was confirmed by esophagoscopy. No further procedures were performed in the remaining patients. Nothing further was added by having the patients perform the Müller or Valsalva maneuvers.

9243 TRANSMURAL POTENTIAL DIFFERENCE (PD) IN THE BODY OF THE ESOPHAGUS IN PATIENTS WITH ESOPHAGITIS, BARRETT'S EPITHELIUM AND CARCINOMA OF THE ESOPHAGUS. (E.) Vidins, E. I., J. A. E. Fox and I. T. Beck (Hotel Dieu Hosp., Kingston, Ontario, Canada). *Am. J. Dig. Dis.* 16(11):991-999, 1971.

Esophageal motility and esophageal transmural potential difference (PD) were measured in normal volunteers (23), patients with proven (10) or suspected (6) esophagitis, Barrett's epithelium (3) and carcinoma of the esophagus (8) simultaneously. Nineteen normal subjects had an easily recognizable steady PD baseline and a maximum to minimum difference of 7 mV or less. Of the 10 patients with endoscopically or biopsy-proven esophagitis, 4 had steady recognizable baselines and 6 did not, but all had PD voltage gradients of 10 mV or more in the body of the esophagus which were considered abnormal. In the 6 patients who had only hyperemia of the lower esophagus, 1 had a normal tracing and 4 had recognizable baselines, but had PD voltage gradients of 8 or 10 mV and were therefore almost normal. All PD tracings obtained on the 3 patients with Barrett's epithelium and the 8 patients with esophageal carcinoma were abnormal, the tracings of the patients with carcinoma all showing deflections of at least 15 mV. Although PD tracings cannot differentiate between esophageal mucosal lesions, simultaneous measurements of PD and esophageal motility appear to be useful in detecting anatomic mucosal disease in addition to motility abnormalities.

9244 ANASTOMOTIC LEAKAGE AFTER EXCISION OF ESOPHAGEAL AND HIGH GASTRIC CARCINOMA. (E.) Inberg, M. V. (U. Turku Dept. Surg., Finland), M. I. Linna, T. M. Scheinin and E. Vanttinen. *Am. J. Surg.* 122(4):540-544, 1971.

9245 VOMITING, ABDOMINAL PAIN AND A LEFT PLEURAL EFFUSION. (E.) Aach, R. (Washington U. Sch. Med., St. Louis, Mo.) and J. Kissane. *Am. J. Med.* 51(3):383-393, 1971.

9246 ABDOMINAL REPAIR OF HIATUS HERNIA. (E.) Kazmers, N. (Kelsey Mem. Hosp., Lakeview, Mich.). *J. Abdom. Surg.* 13(5):112-115, 1971.

9247 STRETCH CLOSURE OF THE TERMINAL ESOPHAGUS AND ITS DISORDERS. (Ger.) Stelzner, F. (Univ. Surg. Clin., Hamburg, Germany). *Dtsch. Med. Wochenschr.* 96(37):1455-1460, 1971.

9248 GIANT LEIOMYOMA OF THE ESOPHAGUS AND CARDIA WEIGHING MORE THAN 1,000 GRAMS. (E.) Tsuzuki, T. (Keio U. Sch. Med., Tokyo), T. Kakegawa and M. Arimori. *Chest* 60(4):396-399, 1971.

9249 ESOPHAGOPLASTY. THE INVERTED GASTRIC TUBE. (Sp.) Mainetti, J. M. (Sch. Med., La Plata, Argentina). *Prensa Med. Argent.* 58(11):574-577, 1971.

9250 METHOD OF ROENTGEN DEMONSTRATION OF H TYPE TRACHEOESOPHAGEAL FISTULA. (E.) Leonidas, J. C. (Mt. Sinai Sch. Med., New York, N. Y.). *Mt. Sinai J. Med.* 38(4):379-383, 1971.

9251 ABDOMINAL OPERATION FOR HIATAL HERNIA. (Dan.) Ingstrup, H. (Odense Hosp., Denmark), E. Kjaergaard and D. Zdravkovic. *Nord. Med.* 85(18):556-558, 1971.

9252 THE HIATAL HERNIA IN GENERAL PRACTICE. (Dut.) Van Der Does, E. *Ned. Tijdschr. Geneeskd.* 115(31):1293-1300, 1971.

9253 CLINICAL FEATURES. RADIOLOGIC DIAGNOSIS AND TREATMENT OF CARDIOFUNDAL MALPOSITIONS IN CHILDREN. (It.) Sernia, O. (Maria Vittoria Hosp., Turin, Italy) and U. Widmer. *Minerva Pediatr.* 23(22):971-980, 1971.

9254 ESOPHAGEAL PERFORATION IN DISSECTING ANEURYSM OF THE AORTA. (Sp.) Guido, J. J. (U. Buenos Aires Sch. Med., Argentina), O. Gennaro, N. Nahmod and R. Beretervide. *Medicina (B. Aires)* 31(2):117-122, 1971.

9255 ATRESIA OF THE ESOPHAGUS IN THE NEWBORN. (Sl.) Skodacek, G. (Komarno, Czechoslovakia). *Lek. Obzor* 20(5):293-297, 1971.

9256 REPEATED COLONIC ESOPHAGOPLASTY. (Rus.) Zhupan, V. F. and G. A. Kataieva. *Klin. Khir.* 51(7):68-70, 1971.

9257 THE CHARACTER OF BIOCHEMICAL CHANGES IN PATIENTS OPERATED UPON FOR CICATRICIAL STENOSIS OF THE ESOPHAGUS FOLLOWING CHEMICAL BURN. (Rus.) Rogacheva, V. S., I. D. Kolomina, P. G. Baidala and V. V. Popova. *Klin. Khir.* 51(5):5-8, 1971.

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9260 EPIDEMIOLOGIC STUDY OF ESOPHAGEAL CARCINOMA IN IRAN. (E.) Mahboubi, E. (U. Teheran Sch. Publ. Health, Iran). *Int. Surg.* 56(2):68-71, 1971.

9261 PREOPERATIVE AND POSTOPERATIVE INTENSIVE CARE THERAPY OF PATIENTS WITH ESOPHAGEAL ATRESIA. (Ger.) Koch, H. (U. Pediatr. Clin., Germany) and N. Schweder. *Arch. Kinderheilkd.* Suppl. 63:148-153, 1971.

9262 OESOPHAGEAL HIATUS HERNIAS. (E.) Ellis Brown, R. S. *Br. J. Clin. Pract.* 25(7):311-319, 1971.

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9265 CICATRICIAL STENOSIS OF THE ESOPHAGUS AS A COMPLICATION OF PROTRACTED PRESENCE OF A FOREIGN BODY. (Rus.) Mitin, I. V. *Vestn. Otorinolaringol.* 33(4):97-98, 1971.

9266 ESOPHAGOPLASTY WITH THE SMALL INTESTINE USING THE FIRST JEJUNAL ARTERY. (Rus.) Rusanov, A. A. and O. I. Iakovlev. *Vestn. Khir.* 107(7):7-11, 1971.

9267 CONGENITAL DIAPHRAGMATIC AND HIATAL HERNIAS. (Fr.) Guttmann, F. M. (St. Justine Hosp., Montreal, Quebec, Canada), P. Racette, A. Abi Haidar and P. Collin. *Union Med. Can.* 100(7):1339-1345, 1971.

9268 RESECTION OF LIMITED EXTENT FOR SQUAMOUS CELL CARCINOMA OF THE ESOPHAGUS: REPORT OF TWO CASES. (It.) Pizzocaro, G. (Natl. Tumor Inst., Milan, Italy). *Tumori* 56(6):353-359, 1970.

9269 CONGENITAL ESOPHAGEAL STENOSIS DISTAL TO ESOPHAGEAL ATRESIA. (E.) Mahour, G. H. (U. Southern California Sch. Med., Los Angeles), P. W. Johnston, J. L. Gwinn and D. M. Hays. *Surgery* 69(6):936-939, 1971.

9270 ESOPHAGEAL MANOMETRY IN CHILDHOOD. INDICATIONS, RESULTS, EVALUATION. (E.) Willich, E. (Univ. Pediatr. Clin., Heidelberg, Germany). *Radiologe* 11(9):321-327, 1971.

9271 STRANGULATED PARAESOPHAGEAL HERNIA WITH GASTRIC NECROSIS. (Sp.) Halabi, M. (Ferroviario Polyclin., Cordoba, Argentina), P. H. Dutto and A. Rulli. *Prensa Med. Argent.* 58(22):1113-1116, 1971.

9272 MANOMETRIC, PHARMACOLOGIC AND RADIOLOGIC STUDY OF THE ESOPHAGUS IN DOGS INJECTED WITH Trypanosoma cruzi. (Sp.) Alva Correa, J. L. (U. Buenos Aires Sch. Med., Argentina). *Medicina (B. Aires)* 31(4):301-308, 1971.

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THE ESOPHAGUS. (Por.) Aldrovando, J. (Polyclin., Rio de Janeiro, Brazil) and T. Franco. *Folha Med.* 62(5):559-576, 1971.

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9276 MALIGNANT ESOPHAGIC TUMORS IN THE ESOPHAGOSCOPIC PICTURE. (Cz.) Kolomaznik, L. (Uherske Hradiste, Czechoslovakia). *Cesk. Otolaryngol.* 20(3):125-129, 1971.

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9278 MANAGEMENT OF ACHALASIA BY TRANSABDOMINAL CARDIOMYOTOMY AND FUNDOPLICATION. (E.) Menguy, R. (U. Chicago Pritzker Sch. Med., Ill.). *Surg. Gynecol. Obstet.* 133(2):482-484, 1971.

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9280 ESOPHAGEAL STENOSIS IN HYPOPHARYNGEAL ABSCESS OF THE NEWBORN. (Ger.) Willi, H. (Sauglingsheim U. Gynecol. Clin., Zurich, Switzerland) and V. Fritz Mikulska. *Schweiz. Med. Wochenschr.* 101(21):781-784, 1971.

9281 CONGENITAL STENOSIS OF THE ESOPHAGUS. (Sp.) Besuschio, S. C. (Pirovano Hosp., Buenos Aires, Argentina), J. L. Massa and F. C. Raffa. *Riv. Chir. Pediatr.* 13(2):105-111, 1971.

9282 CHARACTERISTICS OF HIATUS HERNIA IN INFANCY (FORMS, INDICATION FOR, AND METHOD OF OPERATION). (Ger.) Wurnig, P. (Mautner Markhof Pediatr. Hosp., Vienna). *Paediatr. Paedol.* 6(2):188-199, 1971.

9283 THE RADIOLOGIC PICTURE OF ESOPHAGUS, STOMACH AND DUODENUM AFTER SELECTIVE GASTRIC VAGOTOMY AND PYLOROMYOPLASTY. (Ger.) Sapounov, S. (Marien Hosp., Hamburg, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):423-432, 1971.

9284 SAFEGUARDS IN THE REPAIR OF PHARYNGOESOPHAGEAL DIVERTICULUM. (E.) Van De Water, J. M. (City of Hope Natl. Med. Ctr., Duarte, Calif.). *Surg. Gynecol. Obstet.* 133(5):851-852, 1971.

9285 DIAPHRAGMATIC HERNIA OF MORGAGNI'S FORAMEN. (Pol.) Jesipowicz, M. (Med. Acad. 1st Surg. Clin., Lublin, Poland), A. Jozwiakowski and A. Sawa. *Pol. Przegl. Chir.* 43(5):707-711, 1971.

9286 THE IMPORTANCE OF MEDIASTINOSCOPY IN THE DIAGNOSIS OF CANCER OF THE ESOPHAGUS. (Rus.) Durmanova, N. G. *Khirurgiia (Mosk.)* 47(8):21-23, 1971.

9287 MALIGNIZATION OF CICATRICIAL STRICTURE OF THE ESOPHAGUS AFTER CHEMICAL BURN. (Rus.) Rogacheva, V. S., P. G. Baidila and P. D. Fomin. *Khirurgiia (Mosk.)* 47(8):23-25, 1971.

See also number: 9435

9288 GASTRIC ASPIRATION AFTER VAGOTOMY COUPLED WITH SIMULTANEOUS PYLOROPLASTY.

(Pol.) Sołtysiak, A. (Med. Acad. 3rd Surg. Clin., Lodz, Poland). *Pol. Przegl. Chir.* 43(9):1413-1418, 1971.

A total of 72 patients underwent vagotomy with pyloroplasty. Continuous gastric drainage using a nasogastric tube for 3-4 days after surgery was used in 22 patients; periodic drainage using the tube twice daily during the first 2 days after surgery was employed in 33 patients and no postoperative drainage was employed in 22 patients. The latter group received liquids p.o; 8 hr after surgery (30 ml/hr, then 60 ml/hr) as opposed to the first 2 groups which received no liquids p.o. during several postoperative days. There were no complications. Positioning of patients on the right side facilitated emptying of stomach in those without gastric drainage. Advantages, disadvantages and contraindications of different methods of gastric drainage are discussed, and it is suggested that it may be omitted if the patients are carefully watched for symptoms of gastric retention.

9289 GASTRIC SECRETION AND MORPHOLOGY OF GASTRIC MUCOSA IN ACNE VULGARIS. (Ger.)

Drunkenmölle, R. (Univ. Dermatol. Clin., Halle/Saale, Germany) and U. Schulz. *Dermatol. Monatsschr.* 157(9):648-652, 1971.

Results of the maximal histamine test and biopsy of gastric mucosa performed on 60 young pts (19.2 ± 5.5 yr old) with acne vulgaris selected at random were compared with 2 control groups of 100 randomly selected patients and 25 age-matched patients with healthy skin. Among those with acne normochlorhydria was present in 70%, hypochlorhydria in 23.3%, hyperchlorhydria in 5% and achlorhydria in 1.7%; in age-matched controls in 48%, 44%, 4% and 4%, resp., in older controls (av. age 40.6 ± 10.5 yr) in 41%, 41%, 10% and 8%, resp. In acne patients biopsy revealed a normal mucosa in 66.6%, moderate surface gastritis in 30%, extensive surface gastritis in 1.7% and chronic atrophic gastritis in 1.7%. Among age-matched controls in 80%, 12%, 4% and 4%, resp., and among older controls in 48%, 19%, 22% and 11%. Gastrointestinal symptoms (mostly constipation and fullness) were present in 9/60 patients (15%). Based on a statistical analysis of these results it is concluded that there is no causal relationship between functional disturbances of the gastric mucosa and acne vulgaris.

9290 ETIOLOGY OF CHRONIC GASTRITIS. (Ger.)

Wolff, G. (Robert Rossle Clin., Berlin) and J. Läuter. *Dtsch. Gesundheitsw.* 26(18): 809-814, 1971.

Results of gastric biopsies performed on 1006 clinic outpatients (approx. 33% of whom proved to be healthy) and data on disease, social status and living habits were correlated statistically using the Ridit analysis, the uni- and multivariant analysis of variance and the discriminance analysis method. Significant correlation suggestin etiologic importance was found between chronic gastritis and (in descending order of significance by the multivariant analysis of variance) prolonged wearing of dental prostheses, female sex, low body weight, occupation not related to mental work, a large number of siblings, diabetes, rural residence, premature death of father. It is concluded that many factors play a role in the etiology of chronic gastritis, some of them being exogenous, others endogenous.

9291 EFFECTS OF ROUTE OF ADMINISTRATION ON THE PRODUCTION OF GASTRIC HEMORRHAGE IN THE RAT BY ASPIRIN AND SODIUM SALICYLATE.

(E.) Brodie, D. A. (Merck Inst. Ther. Res., West Point, Pa.) and K. F. Hooke. *Am. J. Dig. Dis.* 16(11):985-989, 1971.

The effect of aspirin administered to food-deprivec rats by 4 different routes on gastric hemorrhage was studied. When administered i.v., the ED_{50} was double that of the oral route (36 and 18 mg/kg, resp). Administration of aspirin directly into the small intestine produced an incidence of hemorrhage similar to that produced by the i.v. route (34 mg/kg, ED_{50}), while aspirin injected into the colon was as effective in producing gastric hemorrhage as was oral administration. Use of dye with intestinal injections indicated that it was not possible to give the drug into the duodenum without a significant amount of regurgitation of the dye into the stomach. In contrast to oral aspirin, oral sodium salicylate was half as irritating; however, it was not possible to produce gastric irritation with sodium salicylate by any other route of administration, even when lethal doses were given.

9292 MULTIPLE CARCINOID TUMORS OF THE STOMACH WITH ENDOSCOPIC OBSERVATIONS.

(E.) Kornfeld, H. R., P. Sherlock (Mem. Hosp., New York, N. Y.) and R. Hertz. *Gastrointest. Endosc.* 18(2):74-77, 1971.

This is the 92nd case of carcinoid tumor of the stomach that has been reported since 1923, the third report of gastric multiple tumors and the first endoscopic report of multiple gastric carcinoid. The patient was a 59-yr-old white female, admitted with a history of postprandial vomiting, epigastric pain, dysphagia, flushing of the face with telangiectasia and a liver enlarged to the umbilicus. An upper GI series revealed sessile and pedunculated filling defects along the curvatures from pylorus to cardia. Gastroscopy revealed at least 20 pedunculated and sessile polyps. A 90% gastric resection was performed, leaving the cardia in situ with several polyps. A 3-cm villous adenoma was removed from the mid-descending colon and several adenomatous polyps were removed from the sigmoid. The microscopic study supported the diagnosis of carcinoid tumor. Enterochromaffin cells of the foregut do not take the argentaffin stain but react with the argyrophil stain. Young cells may not stain at all. Enterochromaffin cells differ depending on site of origin, in staining properties, ultrastructure, biochemical properties and clinical manifestations according to whether they secrete histamine (foregut) or serotonin (midgut).

9293 EFFECTS OF TWO DIFFERENT DIETS ON THE GASTRIC MUCOSA. IMPLICATIONS FOR THE DIAGNOSIS OF GASTRITIS. (Sp.) Vorobioff, S. (Natl. U. Rosario Sch. Med., Argentina), H. Hernández, H. Maturo and E. Roncoroni. *Acta Gastroenterol. Lat. Am.* 2(2):65-77, 1970.

Gastric biopsies after 12 hr fasting were performed on 32 patients on 2 consecutive days: the first, after a diet of eggs and milk; the second, after a free diet which included red wine and broth made from a commercial concentrate. Although no other significant differences were found, the second biopsy showed changes which were characteristic of superficial gastritis in 75% of the main portions of stomachs which had been normal at the time of the first, and irritation-induced intensification of pathologic signs in 62% of the main portions and 40% of the antra in which pathology had been demonstrated previously. In a control group, which received the eggs and milk diet on both days, the only change found at the time of the second biopsy was the disappearance of signs of mild, superficial gastritis in 5 of 23 patients. It is concluded that careful control of the diet for 1 or 2 days before a gastric biopsy is essential.

9294 ELECTROCOAGULATION OF HEMORRHAGIC GASTRITIS. (E.) Blackwood, W. D. (VA Hosp., Minneapolis, Minn.) and S. E. Silvis. *Gastrointest. Endosc.* 18(2):53-56, 1971.

The use of electrocoagulation in the treatment of a 55-yr-old alcoholic male with biopsy-proven cirrhosis is reported and his treatment reviewed with current therapy. The patient was considered a poor surgical risk and during a 5-week course had received 52 units of whole blood. Attempts to control the bleeding by conventional methods were unsuccessful and a steadily deteriorating state was noted. Electrocoagulation was performed by inserting an electrode through a fiber esophago-gastroscope on 16 abnormal areas and required 2 hr. The patient expired 12 hr after the procedure from a sudden massive hemorrhage. As a result of this experience and prior studies on dogs it was felt that power settings in this case were too low and did not occlude the submucosal vessels. Bleeding can be induced by coagulation and was a definite hazard here. The possibility of perforation and cardiac arhythmia must be considered and avoided by placing the indifferent electrode below the diaphragm. A contraindication for electrocoagulation is a transvenous pacemaker.

9295 ATROPHIC GASTRITIS: ITS PREDISPOSITION TO HEMORRHAGE FOLLOWING VACUUM-TUBE GASTRIC BIOPSY. (E.) Limas, C. J. and V. M. Smith (Mercy Hosp., Baltimore, Md.). *Gastrointest. Endosc.* 18(2):59-62, 1971.

During a 7-yr period from October 1962 to November 1969, 416 consecutive gastric biopsies were performed by the authors. Their results were 178 patients (43%) with a normal mucosa, 159 (38%) with chronic superficial gastritis, 47 (11%) with chronic atrophic gastritis, 8 (2%) with diffuse hypertrophic gastritis, and 24 patients (6%) with miscellaneous conditions and other types of gastritis. Significant hemorrhage followed gastric biopsy in 4 patients (0.9%). The case histories of these 4 patients are presented. The authors surveyed the cause of bleeding in 32 cases among 9721 patients reported elsewhere. Conditions that predispose to hemorrhage include a bleeding diathesis and chronic atrophic gastritis. The thin mucosa in atrophic gastritis predisposes mucosal blood vessels to injury and deprives the injured vessels of any tamponade from adjacent areas. The incidence of hemorrhage can also be reduced by meticulous adherence to technique and after the biopsy the rapid drinking of 500 ml of ice cold water, restriction of activity for 1-2 hr, recording of vital signs for 6 hr, and a gastric tube aspiration to check for the presence of fresh blood at 6 hr after biopsy.

9296 THE CLINICAL SPECTRUM OF HYPERTROPHIC HYPERSECRETORY GASTROPATHY. REPORT OF 50 PATIENTS. (E.) Tan, D. T. D., S. J. Stempien (VA Hosp., Long Beach, Calif.) and A. E. Dagradi. *Gastrointest. Endosc.* 18(2):69-73, 1971.

The incidence of hypertrophic hypersecretory gastropathy is more common than generally believed and may play a significant role in peptic ulcer disease. The clinical records of 50 patients with the disease revealed epigastric pain and "cobblestone" mucosa in all; 42 patients showed a prominent rugal pattern, 32 had evidence of duodenal ulcer disease, and 7 had gastric ulcer. The preponderant age of the patients was between 40 and 50 years; 48 of the patients were white males. There were no patients with the Zollinger-Ellison syndrome in the group. A significant number of patients (34%) noted nausea and vomiting. There were no malignancies in the group. Therapeutic results were best in patients who followed an intensive program of bland diets, antacids, anticholinergics, and sedatives. Vagotomy and pyloroplasty should be offered to patients who do not respond to therapy. Antrectomy with vagotomy is justified in cases with extraordinary acid secretion. Radiotherapy may be tried if surgery is contraindicated.

9297 INFECTIOUS DIARRHEA IN PATIENTS WITH ACHLORHYDRIA. RESULTS OF TREATMENT WITH ANTIBIOTICS. (Fr.) Levrat, M. (Edouard Herriot Hosp., Lyon, France), R. Truchot and A. Moulin. *Arch. Fr. Mal. App. Dig.* 60(8-9):385-392, 1971.

In 14 patients with achlorhydria, massive bacterial infestation of the gastric juice was followed by jejunal infestation and chronic, severe diarrhea. Following pilot studies of cultures derived by intubation and treated by various antibiotics, significant improvement or total relief were experienced by 14 of 14, after treatment with terramycin, tetracycline, colimycin, rovamycin, neomycin, erythromycin or mycostatin, as indicated. Although recurrences were frequent, at first, long-term results included 7 complete recoveries, without sequelae; 4 virtually complete recoveries (complete, except for intermittent, slight, tendency to diarrhea) and 1 complete recovery after surgery for dysfunction of an anal sphincter. One patient died of intercurrent septicemia, one of unrelated, postoperative complications.

9298 DELETION OF EPITHELIAL ABH ISOANTIGENS IN PRIMARY GASTRIC NEOPLASMS AND IN METASTATIC CANCER. (E.) Sheahan, D. G., S. A. Horowitz and N. Zamcheck (Boston City Hosp., Mass.). *Am. J. Dig. Dis.* 16(11):961-969, 1971.

ABH blood-group isoantigen activity was measured in the gastric mucosa of 7 patients with chronic peptic ulcer and 9 patients with gastric malignancy using the mixed cell agglutination reaction. A, B and H isoantigens were demonstrable in normal gastric and small intestinal mucosae. Malignant tissues from the 9 patients showed complete absence of ABH isoantigenic activity in 5, reduced or focal activity in 3 (2 of whom had pernicious anemia), and normal activity in only 1. Sections prepared from all metastatic lesions including lymph nodes, peritoneum, omentum, and liver failed to show the presence of A,B or H isoantigens. Although the primary tumors of 3 patients retained activity, the metastases from all 3 showed none. The normal fundic and/or pyloric mucosa obtained from patients with peptic ulcer as well as from those with gastric tumors showed a similar distribution of these isoantigens. The data suggest that an alteration of blood group substance synthesis occurs in malignant epithelium; however, loss or retention of these isoantigens by malignant epithelium bears no consistent relationship to the degree of histologic differentiation.

9299 GIANT, CYSTIC, EXOGASTRIC SCHWANNOMA. DIAGNOSTIC PROBLEMS. REPORT OF ONE CASE. (Fr.) Rautureau, J. (Franco Musulman Hosp., Bobigny, France), G. Gross, J.-P. Clot and G. Chomette. *Arch. Fr. Mal. App. Dig.* 60(10-11): 547-552, 1971.

A massive, exogastric schwannoma, infiltrating the stomach wall and identified by intraoperative biopsy, presented preoperatively as a classic example of post-traumatic pseudocyst of the pancreas.

9300 LIGHT AND ELECTRON MICROSCOPIC STUDIES OF A GASTRIC LEIOMYOBLASTOMA. (E.) Hajdu, S. I. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.), R. A. Erlandson and M. A. Paglia. *Arch. Pathol.* 93(1):36-41, 1972.

A single case is reported of a 56-yr-old white female who presented with a one-month history of sharp epigastric pain and with a mass on the lesser curvature of the stomach on an upper gastrointestinal study. At laparotomy a solitary tumor was found in the anterior wall of the stomach midway between the pylorus and cardia near the lesser curvature. After a frozen section diagnosis of low grade leiomyosarcoma (leiomyoblastoma) a subtotal gastrectomy and omentectomy was performed. The mucosal surface of the stomach was completely intact and the perigastric nodes and omentum were tumor-free. The tumor was a completely encapsulated, fairly round mass with areas of subcapsular lobulation. Microscopically it was composed of fairly uniform round, oval and polygonal cells having well-defined cytoplasmic membranes and displaced round nuclei. No significant number of mitotic cells were seen. Although the majority of the tumor cells were rather large pleomorphic cells with few of the characteristics of smooth muscle, others were present which contained many of the ultrastructural characteristics of smooth muscle cells. The presence of intermediate cell types suggests that these tumors are composed of a spectrum of smooth muscle cells displaying different degrees of differentiation.

9301 SIMPLE ATROPHIC GASTRITIS AND GASTRIC CARCINOMA. (E.) Walker, I. R. (McMaster U., Hamilton, Ontario, Canada), R. G. Strickland, B. Ungar and I. R. Mackay. *Gut* 12(11):906-911, 1971.

Forty patients with atrophic gastritis were followed for up to 21 yr. In this interval, gastric carcinoma was detected in 4 (10%) at 9, 10, 18 and 21 yr after diagnosis of atrophic gastritis by gastric biopsy. All 4 had presented initially with indigestion, and all had achlorhydria. An upper gastrointestinal study was initially normal in 3 and showed a questionable gastric ulcer in the fourth. In the 2 patients so tested, antibodies to parietal cell and to intrinsic factor were not detected. Serum vitamin B_{12} levels were normal on several occasions in 3 and decreased in the fourth who had only a transiently abnormal vitamin B_{12} absorption. Three were blood group A, and the fourth B. Initial biopsy specimens revealed involvement of the antrum with multifocal gastritis in all cases.

9302 NEW ROENTGENOGRAPHIC SIGNS OF NEONATAL GASTRIC PERFORATION. (E.) Pochaczevsky, R. (Jewish Hosp. Med. Ctr., Brooklyn, N. Y.) and D. Bryk. *Radiology* 102(1):145-147, 1972.

Fifty-eight erect abdominal roentgenograms which demonstrated pneumoperitoneum due to gastric perforation in neonates were analyzed in an attempt to determine the radiographic signs that could help distinguish gastric from more distal perforations. In 54 of the 58 cases (93%) the lack of an air-fluid level in the stomach was evident. In addition, the small and large intestines were usually not dilated, and showed a paucity of gas. Twenty-five cases of spontaneous perforation of the small or large intestine in neonates in whom upright abdominal radiographs were obtained were also reviewed. Pneumoperitoneum, mainly due to necrotizing enterocolitis in infancy, was demonstrated in all of these cases. An air fluid level in the stomach was present in 88% (22) of the cases, and significant small intestine distention was also identified in most cases. Thus, the absence of a gastric air-fluid level on erect abdominal roentgenograms, associated with normal or decreased gas in the small and large intestine, favors the diagnosis of gastric perforation in cases of spontaneous pneumoperitoneum in neonates.

9303 GASTRIC POLYPS, POLYPOSIS AND CHRONIC GASTRITIS. (Fr.) Cornet, A. (Laennec Hosp., Paris), P. Renault, F. Carnot, D. Blanc, P. Pelavierre and G. Terris. *Arch. Fr. Mal. App. Dig.* 60(10-11):507-524, 1971. (51 references)

A review includes report of 4 patients with 1-4 isolated, gastric polyps (none malignant) and 3 with diffuse gastric polyposis (2 of 3, malignant; 1 of 2, metastasized extensively). All were suffering from hypochromic anemia and chronic atrophic gastritis, and all were treated surgically. Recommended as the techniques of choice are collar resection of solitary or isolated polyps, subtotal or total gastrectomy in the presence of diffuse polyposis.

9304 DIAGNOSIS OF GASTRIC VARICES BY CONVENTIONAL ROENTGENOGRAPHY AS COMPARED WITH SPLENOPORTAL PHLEBOGRAPHY. (E.) Gabrielsson, N. (Karolinska Hosp., Stockholm). *Acta Radiol.* [*Ther.*] *(Stockh.)* 11(5):506-514, 1971.

The diagnostic reliability of the conventional roentgen examination in demonstrating gastric varices was analyzed in a material of 28 cases and confirmed by splenoportal phlebography. The fairly characteristic roentgenographic appearances of gastric varices was observed in only 4 advanced cases; in 2 other cases gastric varices were suggested. Comparison between splenoportal phlebography and conventional roentgen examination revealed coils of gastric varices corresponding to mucosal distortion, usually large tortuous gastric folds in 6 additional cases. Downward displacement of gastric gas was present in 10 cases and all but 1 had extensive esophageal varices. The displacement may have been caused by splenomegaly and the diagnostic value of this sign is not highly considered. Splenomegaly was the most common indirect sign of gastric varices (23 of 28 cases). Splenoportal phlebography is the most reliable roentgenographic method of demonstrating gastric varices.

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9367 X-RAY DIAGNOSIS OF A LESION IN THE PYLORIC PORTION OF THE STOMACH, ESPECIALLY A CANCEROUS LESION. (Jap.) Hayakawa, H. (Juntendo U., Dept. Intern. Med., Tokyo) and H. Shirakabe. *Stomach Intest. (Tokyo)* 6(8):1000, 1971.

9368 MASS SURVEY OF THE STOMACH WITH THE GASTROCAMERA. (Jap.) Fujita, K. (Fujita Clin., Koshigaya City, Japan), H. Niwa, Y. Utsumi and T. Sakita. *Stomach Intest. (Tokyo)* 6(6):705-712, 1971.

9369 MASS SURVEY OF THE STOMACH BY X-RAY TELEVISION. (Jap.) Murakami, K. (Kyoto Pref. U. Dept. Radiol., Japan). *Stomach Intest. (Tokyo)* 6(6):699-704, 1971.

9370 ASSIMILATION OF FATS BY PATIENTS WITH CHRONIC ANACID GASTRITIS. (Rus.) Savoschenko, I. S., V. N. Budagovskaia and L. M. Krums. *Sov. Med.* 34(5):48-52, 1971.

9371 DIGESTIVE DISORDERS IN PATIENTS WITH A HISTORY OF GASTRECTOMY. (Rus.) Kuzin, M. I., V. G. Riabtsev, M. O. Vinogradova and L. P. Biandin. *Sov. Med.* 34(5):43-48, 1971.

9372 GASTRIC ADENOCARCINOMA. (Fr.) Imbert, R. (Cochin Hosp., Paris). *Sem. Hop. Paris* 47(23):1494-1495, 1971.

9373 INTRAMURAL GASTRIC MYOID TUMOUR UNDERGOING CALCIFICATION AND DEGENERATION. (Fr.) Charles, J. (80 Boulevard Saly, Valenciennes, France), R. Delacroix, A. Dupont and A. Berrie. *Sem. Hop. Paris* 47(23):1489-1493, 1971.

9374 DIAGNOSTIC SIGNIFICANCE OF DETERMINATION OF B GLUCURONIDASE ACTIVITY IN GASTRIC JUICE. (Ger.) Simon, L. (Jaszberený Hosp., Hungary) and A. I. Figus. *Schweiz. Med. Wochenschr.* 101(14):499-501, 1971.

9375 GASTRIC BIOPSY FINDINGS IN DYSPEPSIA AND GASTRITIS. (It.) Scaffidi, L. (U. Messina Inst. Spec. Med. Pathol., Italy). *Rif. Med.* 85(28):800-806, 1971.

See also numbers: 9027, 9050, 9079, 9188, 9208, 9209, 9211, 9232, 9271, 9440, 9464, 9547

9376 SERIAL ENDOSCOPIC OBSERVATION OF THE EFFECTS OF HISTAMINE, ASPIRIN, STEROIDS, AND ALCOHOL ON STANDARDIZED GASTRIC ULCERS IN DOGS. (E.) Sugawa, C., C. E. Lucas and A. J. Walt (Wayne State U. Sch. Med., Detroit, Mich.). *Gastrointest. Endosc.* 18(2):56-58, 1971.

The ulcers were produced in 52 dogs by acetic acid injection into the anterior wall of the antrum and body of the stomach and averaged 154 in ulcer index (length x width in mm) with penetration to the serosa. The index without medication averaged 20 by 3 weeks and 0 by 6 weeks with no difference in healing between antral and body ulcers. Mucin was measured by stain (2.8 for the control) and superficial erosions noted (none for the control). Aspirin administration gave the same values as the control in the antrum; in the body aspirin resulted in an index of 25, and moderate erosions. Histamine administration resulted in an index of 40 in the antrum with marked erosion; in the body the index was 50 and erosions moderate. Steroid administration resulted in an index of 15 for both antrum and body and moderate erosions. The index for alcohol was zero with minimum erosions in both areas.

9377 MECHANISM OF THE ANTIPEPTIC ACTION OF AMYLOPECTIN SULFATE (SN-263), AN ANTI-ULCER, MUCIN-LIKE AGENT. (E.) Cammarata, P. S. (G. D. Searle Co. Biochem. Res., Chicago, Ill.), R. G. Bianchi and F. J. Fago. *Gastroenterology* 61(6):850-857, 1971.

The inhibition of peptic activity could be affected in vitro by combination of amylopectin sulfate (SN-263) with either pepsin or hemoglobin (the substrate). The contribution of the substrate inhibitor complex to the overall inhibition of peptic activity was greater than that of the enzyme inhibitor complex. Proteolysis of an insoluble substrate was effectively inhibited by low concentrations of free SN-263, the inhibition being independent of time, but dependent on the concentration of free SN-263. Significant inhibition of proteolysis was also achieved by bound SN-263, in the absence of free SN-263. Following gastrin stimulation in dogs with gastric fistulas, bound SN-263 inhibited the proteolysis of insoluble substrate by canine gastric juice. This degree of inhibition was dependent upon the concentration of SN-263. Oral administration of methylene blue-dyed SN-263 (aqueous) to a dog resulted in binding of dyed inhibitor to both gastric and duodenal mucosa. The duration and degree of binding was a function of concentration and dose of administered drug. The mucosal binding duration time with a 30 mg/kg dose at a concentration of 50 mg/ml was 4 hr, while the minimal mucosal saturation dose was 15.0 mg/kg.

9378 PROGNOSTIC VALUE OF THE AUGMENTED HISTAMINE TEST IN ULCER DISEASE AND X-RAY NEGATIVE DYSPEPSIA. (E.) Bonnevie, O. (Gentofte Hosp., Copenhagen), H. E. Kallehauge, H. R. Wulff and M. R. Wulff. *Scand. J. Gastroenterol.* 6(8):723-729, 1971.

A follow-up study of 108 previously hospitalized patients with duodenal ulcer, gastric ulcer or X-ray negative dyspepsia on whom augmented histamine tests were performed 24-52 months previously was conducted to evaluate the prognostic value of this test. In medically-treated gastric and duodenal ulcer patients no correlation was found between the acid output during the admission and the severity of symptoms after the follow-up period. In patients with X-ray negative dyspepsia both basal acid output and peak acid output were negatively correlated with the post-hospitalization clinical findings. A positive correlation between PAO and severity of symptoms was observed in female gastric ulcer patients who were surgically treated. In medically treated men with duodenal ulcer disease and X-ray negative dyspepsia, a significant positive correlation was found between duration of disease and clinical symptoms at follow-up. Thus, the evidence does not support the use of the augmented histamine test for predicting the prognosis of ulcer patients.

9379 PHARMACOLOGIC STUDY OF THIOCARBOXAMIDES WHICH INHIBIT GASTRIC SECRETION AND PROTECT AGAINST ULCERATION. (Fr.) Pascaud, X. (Science-Union Co. Res. Group., Suresnes, France) and M. Laubie. *Arzneim. Forsch.* 21(10):1547-1553, 1971.

When studied in mice, rats and dogs, no evidence of anticholinergic, adrenolytic, histaminolytic or gangioplegic activity, or of cardiovascular or central nervous system side effects, could be demonstrated in 15 of 22 thiocarboxamide derivatives showing significant antisecretory and ulceroprotective activity. All 15 were also subjected to acute toxicity studies. In 9 of 15, which showed the greatest antisecretory activity in rats, effective doses ranged from one-hundredth to one six-hundredth of the peroral LD_{50}. The protection afforded against restraint-induced ulceration appeared to be directly related to the degree of their ability to inhibit both the volume and the acid concentration of gastric secretions at these dose levels.

9380 EFFECTS OF NICOTINE ON GASTRIC SECRETION AND ULCER FORMATION IN CATS. (E.) Konturek, S. J. (Med. Acad. Inst. Physiol., Cracow, Poland), T. Radecki, P. Thor, A. Dembinski and E. D. Jacobson. *Proc. Soc. Exp. Biol. Med.* 138(2):674-677, 1971.

Nicotine, added to an i.v. infusion of pentagastrin, at a dose of 400 µg/kg-hr, but not at 100 and 200 µg/kg-hr, produced a decrease in acid secretion in 10 fasted cats with small gastric fistulas. The depression of acid output was due to a decreased volume and acid concentration and was accompanied by retching and restlessness in some animals. Nicotine alone failed to alter basal gastric secretion. A maximal rate of duodenal ulcer formation with perforation or hemorrhage occurred when the nicotine dose was 200 μg/kg-hr which corresponds to smoking 8 cigarettes/hr. Nicotine exhibited a potentiating effect on pentagastrin induced peptic ulcer formation, probably due to its interference with acid neutralization in the duodenum.

9381 EXPERIMENTAL STUDIES OF THE RELATIONSHIPS BETWEEN CARBONIC ANHYDRASE ACTIVITY IN THE GASTRIC MUCOSA, ULCERATION AND PREGNANCY, IN THE RAT. (Fr.) Dobrescu, D. (Sch. Pharm., Bucharest, Rumania), A. Cicotti and R. Lungu-Mihailescu. *Arch. Fr. Mal. App. Dig.* 60(8-9): 427-432, 1971.

In rats subjected to stress by immobilization, for the purpose of inducing gastric ulcer, gastric carbonic anhydrase activity (manometric study) was increased in non-pregnant females at a very high level of significance, as compared to either pregnant or non-pregnant, unstressed controls. In pregnant females, stressing induced no significant increase of activity. It was concluded that pregnancy may have increased the capacity of the organism to neutralize histamine, which is required to activate carbonic anhydrase.

9382 TRANSGASTRIC DUODENOSTOMY IN THE TREATMENT OF GASTRIC ULCER. (Pol.) Bernacki, E. (Med. Acad. Inst. Surg., Bialystok, Poland) and H. Dadan. *Pol. Przegl. Chir.* 43(9): 1405-1408, 1971.

Transgastric duodenostomy gave excellent results in 3 elderly patients in poor general condition with extensive, inoperable gastric ulcer in which a tumor-like inflammatory infiltration surrounding the ulcer involved the whole posterior wall of the stomach, pancreas and great blood vessels behind it. Marked improvement in general condition with weight gain and regression of the lesion was obtained after a 3 month period of feeding through the gastroduodenostomy. All 3 patients were well after 4, 3, and 1.5 yr, resp. It is stressed that this procedure which can be used as a preliminary step before the generally accepted method of surgical management of gastric ulcer, can sometimes effect a cure by itself.

9383 THE EFFECT OF CAERULEIN ON GASTRIC SECRETION AND PEPTIC ULCERS. (Pol.) Radecki, T. (Med. Acad. Inst. Physiol., Cracow, Poland), S. Konturek, J. Biernat and P. Thor. *Acta Physiol. Pol.* 22(5):597-608, 1971.

Experiments with cats revealed that caerulein (0.5 - 1.6 μg/kg/hr) caused a dose-dependent increase in basal gastric secretion (increase in volume from 1 ml - 19 ml/15 min increase in HCl from 0.29 - 4.62 mEq/hr with 0.05 μg and 1.6 μg/kg, resp). There was a dose-dependent inhibition of pentagastrin induced secretion (from 23% inhibition with 0.05 μg/kg caerulein to 49% inhibition with 0.8 μg/kg caerulein), and a 0.4 μg/kg/hr dose administered simultaneously with low doses of pentagastrin (0.5 μg, 2.0 μg) stimulated gastric secretion, but decreased secretion induced by maximal dose (8.0 μg/kg/hr) of pentagastrin (8.0 μg/kg/hr) by 30%. Caerulein (0.8 μg/kg) also inhibited frequency and extent of pentagastrin (8.0 μg/kg for 36 hr) induced peptic ulcers (from an average 246 mm^2 ulcerated surface in all 10 cats receiving pentagastrin alone to an average of 24 mm^2 surface in 3 of 10 animals receiving caerulein in addition to pentagastrin). In addition, while 3 of 10 cats receiving pentagastrin alone showed perforation or hemorrhage from ulcers, none of those receiving caerulein showed these complications. Caerulein admin. alone (0.8 μg/kg for 36 hr) induced ulcers in 4 of 18 animals (av. 9 mm^2 surface area).

9384 SOME PROBLEMS OF GASTRODUODENAL ULCER. (Rus.) Kolomiichenko, M. I. and I. P. Boikov. *Sov. Med.* 34(5):52-57, 1971.

9385 X-RAY DIAGNOSIS OF PREPYLORIC ULCER. (Jap.) Mochizuki, F. (Tohoku U. Sch. Med., Sendai, Japan). *Stomach Intest. (Tokyo)* 6(8):1001-1013, 1971.

9386 MASSIVE HEMORRHAGE FROM PEPTIC ULCER IN PATIENTS OVER AGE 45. (E.) Chaitin, H. (Whitestone Hosp., N. Y.). *Clin. Med.* 78(8): 34-36, 1971.

9387 STUDIES ON ABOMASAL ULCERS IN CALVES FED MILK SUBSTITUTES AND INTENSIVELY REARED. (Ger.) Groth, W. (Tech. U. Munich, Germany) and H. Berner. *Zentralbl. Veterinarmed. [A]* 18(6):481-498, 1971.

9388 STRESS ULCER IN THE PUERPERIUM. (CASE PRESENTATION). (Ger.) Thieme, R. (Tech. U. Munich, Gynecol. Clin., Germany) and W. Theisinger. *Zentralbl. Gynaekol.* 93(26): 894-897, 1971.

9389 VAGOTOMY: PRESENT SITUATION IN THE TREATMENT OF PEPTIC ULCER. (Por.) Bruno De Mello, J. (U. Sao Paulo Sch. Med., Brazil), A. Moreira and A. Garrido, Jr. *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 26(2):75-82, 1971.

9390 CLINICAL STUDY OF JUVENILE PEPTIC ULCER. (It.) Docimo, R. (U. Naples Inst. Gen. Clin. Surg., Italy), D. Bruni and C. Catanzano. *Rass. Int. Clin. Ter.* 51(10):583-592, 1971.

9391 PLANNED SURGICAL TREATMENT OF CHRONIC DUODENAL ULCER. (Pol.) Morel, C. J. (U. Buenos Aires 3rd Dept. Surg., Argentina). *Pol. Tyg. Lek.* 26(26):984-985, 1971.

9392 CONSERVATIVE SURGERY IN 100 PATIENTS WITH BLEEDING PEPTIC ULCER. (E.) Boulos, P. B. (Univ. Coll. Hosp. Med. Sch., London), J. Harris, J. H. Wyllie and C. G. Clark. *Br. J. Surg.* 58(11):817-819, 1971.

9393 SITUS INVERSUS TOTALIS WITH PERFORATION OF A DUODENAL ULCER. (E.) Hughes, S. P. F. (Roy. Postgrad. Med. Sch., London) and P. M. Perry. *Br. J. Clin. Pract.* 25(10):464-465, 1971.

9394 REGENERATION OF THE GASTRIC EPITHELIA IN MICE. AN ELECTRON MICROSCOPIC STUDY. (E.) Tahara, E. (Univ. Sch. Med., Hiroshima, Japan). *Hiroshima J. Med. Sci.* 20(1-2):65-99, 1971.

9395 GASTROCOLIC FISTULA SECONDARY TO A BENIGN GASTRIC ULCER: A CASE REPORT AND A REVIEW OF THE LITERATURE. (E.) Haimov, M. (City Hosp. Ctr., Elmhurst, N. Y.), G. Garami and A. Belman. *Mt. Sinai J. Med.* 38(4):400-404, 1971.

9396 POSTOPERATIVE PEPTIC ULCERS. (Fr.) Boustany, F. N. (French Sch. Med., Beirut, Lebanon). *J. Med. Liban.* 24(2):173-191, 1971.

9397 LATE RESULTS OF MODIFIED BILLROTH I OPERATION IN THE TREATMENT OF ULCER PATIENTS. (Ger.) Lazar, D. (City Hosp., Nagykanizsa, Hungary). *Chirurg* 42(8):372-375, 1971.

9398 THE RELATION OF LAMBLIASIS AND DUODENAL ULCER. (PRELIMINARY REPORT). (Cz.) Kvasz, L. (Charles U. Sch. Med., Bratislava, Czechoslovakia). *Cesk. Pediatr.* 26(4):183-184, 1971.

9399 BASELINE GASTRIC SECRETION AND PRE-OPERATIVE STUDY OF HYDROCHLORIC ACID SECRETION IN THE SURGICAL TREATMENT OF PEPTIC ULCER. (Sp.) Diez Cascon, A., J. Vidal Sans and J. Guerrero. *Barcelona Quir.* 15(3):221-237, 1971.

9400 ATYPICAL GASTRIC RESECTION WITH HOSE CONSTRUCTION FOR THE MANAGEMENT OF HIGH PENETRATING ULCER OF THE POSTERIOR WALL. (Ger.) Horntrich, J. (Reg. Hosp., Cottbus, Germany). *Chirurg* 42(1):37-40, 1971.

9401 LONG TERM RESULTS IN THE SURGICAL TREATMENT OF THE GASTRODUODENAL ULCER. (E.) Casal, M. A. (City Hosp., Buenos Aires, Argentina), M. Gross and O. J. Papa. *Acta Gastroenterol. Lat. Am.* 2(2):79-86, 1970.

9402 INTRACTABILITY OF ULCERS OF THE UPPER GASTRODUODENAL TRACT. (E.) Powell, J. R. (Kaiser Found. Hosp., Richmond, Calif.). *Am. J. Gastroenterol.* 56(6):501-511, 1971.

9403 STATE OF THE PROTEINOGENIC FUNCTION OF THE LIVER IN COMPLICATED PEPTIC ULCER BEFORE AND AFTER GASTRIC RESECTION. (Rus.) Petrovich, E. N. *Zdravookhr. Beloruss.* 17(7): 23-25, 1971.

9404 REPEAT GASTRECTOMIES FOR PEPTIC ULCER. (Rus.) D'iachenko, P. K. and M. F. Mazurik. *Vestn. Khir.* 107(7):18-22, 1971.

9405 HISTAMINE FORMATION IN PATIENTS WITH PEPTIC ULCER AND CHRONIC GASTRITIS AND ITS CHANGES UNDER THE INFLUENCE OF TREATMENT. (Rus.) Eidelman, F. M. *Ter. Arkh.* 43(6):34-37, 1971.

9406 GASTRIC ULCER IN SOUTH AUSTRALIA, 1954-1963. II. SYMPTOMATOLOGY AND RESPONSE TO TREATMENT. (E.) Alp, M. H. (Queen Elizabeth Hosp., Adelaide, Australia), I. G. Hislop and A. K. Grant. *Med. J. Aust.* 1(7):372-375, 1971.

9407 PIGMENT-FORMING AND EXCRETORY FUNCTION OF THE LIVER IN PATIENTS WITH PEPTIC ULCER. (Rus.) Belskaia, T. D. *Ter. Arkh.* 43(6):32-34, 1971.

9408 MAST CELL APPARATUS OF THE GASTRIC MUCOSA IN DUODENAL ULCER. (Rus.) Fisher, A. A. and Z. K. Lopunova. *Ter. Arkh.* 43(6):29-32, 1971.

9409 STATE OF ARTERIAL HEMODYNAMICS IN PEPTIC ULCER. (Rus.) Komarov, F. I. and V. A. Bushlia. *Ter. Arkh.* 43(6):17-22, 1971.

9410 SOME INDICES OF FAT METABOLISM IN PATIENTS WITH PEPTIC ULCER. (Rus.) Vainshtein, S. G. *Ter. Arkh.* 43(6):22-25, 1971.

9411 GASTRIC ULCERS: THE CASE FOR SURGICAL MANAGEMENT. (E.) Strode, J. E. *Straub Clin. Proc.* 37(1):24-29, 1971.

9412 THE EFFECT OF ENVIRONMENTAL FACTORS IN THE ARCTIC ON THE PREVALENCE, EVOLUTION AND SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCER IN THE MAGADAN REGION. (Rus.) Chudinov, V. S. *Sov. Med.* 34(5):57-60, 1971.

9413 TREATMENT OF PATIENTS WITH GASTRIC AND DUODENAL ULCER IN THE LIGHT OF CURRENT CONCEPTS. (Rus.) Maiat, V. S. *Sov. Med.* 34(5): 3-9, 1971.

9414 PATHOGENESIS OF HEPATOGENIC ULCER. (Ger.) Gheorghiu, T. (U. Cologne Med. Clin., Germany), H. Frotz and H. J. Klein. *Praxis* 60(41):1368-1374, 1971.

9415 CARCINOMA OF THE GASTRIC STUMP AFTER GASTRECTOMY FOR ULCER. ROENTGENOLOGIC APPEARANCES. (Fr.) Haehnel, P. (CHU Gen. Surg. Serv., Strasbourg, France), J. Seror and D. Jaeck. *J. Radiol. Electrol. Med. Nucl.* 52(6-7): 383-386, 1971.

9416 SEGMENTAL GASTRIC RESECTION AND VAGOTOMY IN DUODENAL ULCER. (Ger.) Largiader, F. (Univ. Surg. Clin. A, Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 101(33):1204-1207, 1971.

9417 ACUTE PEPTIC ULCERS. (Cz.) Hejnal, J. (Inst. Clin. Exp. Surg., Prague), L. Hejhal, K. Soudek and P. Firt. *Rozhl. Chir.* 50(4):179-187, 1971.

9418 A REVIEW OF GASTRODUODENAL PATHOLOGY IN BUSOGA DISTRICT, UGANDA. (E.) Hancock, B. D. (Kamuli Mission Hosp., Busoga, Uganda). *East Afr. Med. J.* 48(3):103-108, 1971.

9419 IN VITRO INVESTIGATIONS OF NEUTRALIZING AND ANTIPEPTIC PROPERTIES OF SOME SPA PRODUCTS. (Pol.) Pawelczak, M. (Skrytka Pocztowa 1027, Poznan, Poland). *Balneol. Pol.* 16(1-2): 35-39, 1971.

9420 COMPARISON OF THE EXPERIMENTAL ULCEROGENIC EFFECTS OF INDOMETHACIN AND OTHER ANTI-INFLAMMATORY DRUGS. (Ger.) Bonomo, L. (U. Bari Med. Clin., Italy) and A. Tursi. *Arzneim. Forsch.* 21(11a):1812-1815, 1971.

9421 HUMORAL MECHANISM OF ULCER RESISTANCE OF THE ORGANISM ADAPTED TO PHYSICAL EXERCISE. (E.) Frenkel, R. (Semmelweis Med. U., Budapest). *Acta Med. Acad. Sci. Hung.* 28(1): 69-73, 1971.

9422 SELECTIVE PROXIMAL VAGOTOMY WITH AND WITHOUT PYLOROPLASTY IN THE TREATMENT OF DUODENAL ULCER. (E.) Hedenstedt, S. (Nacka Hosp., Stockholm, Sweden) and S. Moberg. *Acta Chir. Scand.* 137(6):547-550, 1971.

See also numbers: 9427, 9839, 9852

9423 SELECTIVE ARTERIOGRAPHY DURING THE HEMORRHAGIC PHASE OF NON-DILATED ANGIOMAS OF THE JEJUNUM. (Fr.) Lagache, G. (CHU Surg. Clin., Lille, France), C. Proye, J. P. Maillard and J. Chevert. *Acta Gastroenterol. Belg.* 34(8-9):633-643, 1971.

Selective arteriography during a period of active hemorrhaging permitted the first demonstration of the presence of 2 submucosal, non-dilating angiomas in the wall of the jejunum of a 19-yr-old boy who was experiencing a third major episode of hematemesis and malena in five and one-half yr. At the time of report the patient had been symptom-free for 7 months following surgery and discharge from the hospital. The report is supplemented by a review of the available literature (38 references) concerning this relatively rare, vascular anomaly.

9424 STIMULATION OF GLYCOGENOLYSIS BY PURIFIED CHOLERA EXOTOXIN IN DISRUPTED CELLS. (E.) Zieve, P. D. (Baltimore City Hosps., Md.), N. F. Pierce and W. B. Greenough, III. *Johns Hopkins Med. J.* 129(6):299-303, 1971.

Platelet lysates were prepared from normal human volunteers and liver homogenates from normal male Wistar rats for in vitro studies. For in vivo studies from purified cholera toxin (2 µg in 0.2 ml) was injected into the tail vein of ICR adult mice, who were sacrificed after 7 hr. The livers were removed for the preparation of homogenates. In the in vitro preparations, after 15 min of incubation at 37°C with purified cholera exotoxin (0.5 µg/ml final concentration), the rate of glycogenolysis had increased by 36% in platelets, and 61% in liver homogenates. No effect was seen when the toxin had been boiled for 10 min. Glycogenolysis was not altered by cholera toxin in washed unlysed platelets. In the in vivo preparations, the glycogen content of the liver was depressed in rats receiving the toxin i.v.

9425 ULCERATION AND OBSTRUCTION IN AN ANTIPERISTALTIC JEJUNAL SEGMENT OF EXCESSIVE LENGTH. (E.) Herrington, J. L., Jr. (Vanderbilt U. Med. Ctr., Nashville, Tenn.). *Am. J. Surg.* 122(6):825-828, 1971.

A 61-yr-old woman with gastric outlet obstruction resulting from ulceration and stenosis in an antiperistaltic jejunal segment interposed 6 yr previously for treatment of the dumping syndrome is presented. The antiperistaltic jejunal segment, measuring 15 cm in length, was unquestionably too long. The patient remained almost symptom-free for 5 yr after construction of the jejunal reversal segment. When symptoms did recur they were at first mild and gradual in onset. Stasis, ulceration, and stenosis of the interposed segment resulted in the observed obstruction. At reoperation the hypertrophy and thickening of the reversal segment were considerably more marked at its proximal end near the gastric remnant which was left after a previous Billroth II resection. The mucosal ulcerations were also more prominent in the portion of the reversal segment nearest the stomach. The segment was replaced by a segment of shorter length. Thus, insertion of an antiperistaltic jejunal segment not exceeding 8-10 cm in length for the treatment of severe dumping symptoms is recommended.

9426 LONG-TUBE GASTROSTOMY WITH INTERNAL INTESTINAL SPLINTING IN INFLAMMATORY DISEASE OF THE SMALL INTESTINES. (E.) Thow, G. B. (Urbana, Ill.). *Dis. Colon Rectum* 15(1): 7-10, 1972.

A technique of long intestinal tube gastrostomy which involves internal splinting of the small intestine is described, and the indications for and advantages of this procedure are discussed. Indications include the presence of extensive adhesions or the necessity for a second operation for adhesive obstruction when additional adhesions will undoubtedly be present. Internal bowel splinting is also indicated for regional enterocolitis or ulcerative colitis, for the Bricker ileal conduit procedure, for exenteration or extensive denuding of the bowel, and for small intestinal anastomosis. Long tube gastrostomy with internal intestinal splinting increases the safety of dissection of distended edematous inflamed bowel and the technic is essentially free of the complications involved in suture-plication procedure. The number of anastomoses that can be done is also increased with preservation of an increased amount of normal intervening small intestine in regional enteritis. Inflation of the bowel by a soft ballon to facilitate dissection in navigating the bowel is also suggested.

9427 INTESTINAL OBSTRUCTION DUE TO ANTACID TREATMENT FOR DUODENAL ULCER: REPORT OF A CASE. (E.) Levinsky, L. (Beilinson Hosp. Med. Sch., Petach Tiqva, Israel) and I. Urca. *Dis. Colon Rectum* 15(1):55-56, 1972.

A case of intestinal obstruction which occurred in a 58-yr-old male as a result of antacid therapy in the treatment of duodenal ulcer is reported. A week before admission he began to suffer from more severe peptic ulcer symptoms than usual (he had the ulcer for 26 yr) and took his antacid mixture every hour in large quantities, instead of after each meal. Three days before admission his abdomen became distended, with colicky abdominal pain, and defecation ceased. An X-ray of the abdomen showed radiopaque masses in the large intestine, with distention and fluid levels in the small intestine. A diagnosis of mechanical obstruction of the large intestine by concretions was made. The concretions were thought to have resulted from over-ingestion of the antacid powder which contained benzocaine, belladonna, magnesium oxide, bismuth carbonate, codeine phosphate, and sodium bicarbonate. The patient was successfully treated with i.v. fluids and repeated enemas.

9428 CLINICAL ASPECTS OF CHRONIC INTESTINAL ISCHEMIA. (Ger.) Stopik, D. (Free U. Berlin. Westend Clin.), H. Frisius, B. Krüger, F.-W. Mielke, K. E. Hampel and H. Sonderkamp. *Dtsch. Med. Wochenschr.* 96(45):1749-1755, 1971.

The importance of detailed angiography in patients with upper abdominal symptoms from undiagnosed causes is demonstrated. Six cases of chronic intestinal ischemia presenting diagnostic difficulties are described. Depending on extent and degree of stenosis and vascular changes, the patients were treated either by surgical intervention (4 of 6) or conservative measures (2 of 6). Good results were obtained when correct diagnosis was made early. In all 6 patients the usual clinical, biochemical and radiological diagnostic methods had failed to reveal the underlying cause of severe symptoms.

9429 FREE OMENTUM TRANSPLANT FOR THE TREATMENT OF INTESTINAL ISCHEMIA. (Pol.) Gołab, W. (Med. Acad. 1st Surg. Clin., Zabrze, Poland) and K. Smigla. *Pol. Przegl. Chir.* 43(9): 1373-1377, 1971.

Grafting of the free omentum between the abdominal aorta and intestinal arcades for treatment of intestinal ischemia resulting from disseminated atherosclerosis of mesenteric blood vessels in a 59-yr-old patient is described. The patient died 9 days after surgery from pneumonia, but histopathologic examination revealed good viability with excellent revascularization and innervation of the graft which grew into the surrounding tissues. The surprisingly good revascularization capacity of free omentum transplants is briefly discussed.

9430 NOBLE PLICATION FOR INTESTINAL OBSTRUCTION. (E.) Bergqvist, D. (Univ. Hosp., Uppsala, Sweden) and U. Krause. *Scand. J. Gastroenterol.* 6(8):699-705, 1971.

Twenty-five of 27 patients who underwent Noble plication for obstruction of the small intestine were followed for periods ranging from 2-20 yr. One patient died in the immediate postoperative period. The average length of time between the primary operation and the plication was 7.4 yr (0-45 yr range). In 17 patients plication of the entire small intestine was performed, and in 10 patients plication of different lengths was carried out. The end result of the follow-up was that 19 patients were completely satisfied with the Noble plication, 2 patients are satisfied and have occasional colic pain, 1 patient is dissatisfied with the results and 2 patients died during the follow-up but were free of abdominal symptoms. Single silk sutures placed at the mesenteric border are recommended and the pockets of the mesenteric root should be closed unconditionally. Of the 4 observed recurrences, 3 could be attributed to failure to observe these guidelines. The Noble plication method is indicated in recurrent intestinal obstruction due to adhesions and extensive serosal lesions.

9431 INTERRELATIONSHIPS OF INTUSSUSCEPTION AND THE INTEGUMENTARY SYSTEM. (E.) Greenstein, A. J. (City U. Mt. Sinai Sch. Med., New York, N. Y.), R. A. Beck and A. E. Kark. *Surg. Gynecol. Obstet.* 133(6):999-1000, 1971.

The recognition of ileoileal or jejunoileal intussusception and/or underlying tumor prior to surgery is difficult and perplexing. Previous clues that have aided in this diagnosis have included a prior intussusception, age of incidence, recent removal of a long intestinal tube and radiological signs of cupping, coil spring look of the distal ileum and the crescentic termination or pitchfork appearance of the barium enema. The skin and mucous membranes can also be used to aid in the diagnosis of these conditions. Multiple neurogenic tumors of the intestine are often associated with neurofibromatosis and the café au lait spots of this disease aid the diagnosis. Other skin abnormalities include melanin pigmentation in the Peutz-Jeghers syndrome, the tumor masses of Gardner's disease, and the alopecia, nail atrophy and hyperpigmentation of the Cronkhite and Canada syndrome variants. Malignant lesions in the small intestine are also associated with skin manifestations of melanoma, the malignant reticuloses, and the seborrheic warty lesions of colonic neoplasia. The presence of argentaffinomas is detected by flushing, and various bleeding diatheses precede intramural hematoma formation. Recognition of these conditions allows for early operative intervention.

9432 A CASE OF INTRALUMINAL DUODENAL DIVERTICULUM. (Fr.) Hoang, N. D. (Binh-Dan Hosp., Saigon, South Vietnam) and N. T. Lan. *Arch. Fr. Mal. App. Dig.* 60(10-11):553-558, 1971.

In a 21-yr-old man, an intraluminal duodenal diverticulum resembled the gallbladder in both size and shape, when filled with barium, and was clearly demarcated by a thin, clear border, formed by the diverticular wall. (This wall, in turn, was formed by the adhesion of 2 layers of mucosa, with no other tissue involved). However, when partially filled by alimentary debris or fluid, insufficient barium was introduced to permit its visualization. When first coated with barium, it measured 1 by 2 cm. In response to barium filling, it expanded within a few min to 4 by 7 cm and finally dilated to reach the full diameter of the duodenum, accompanied by progressive thinning of the diverticular wall until the image of the diverticulum was completely obscured by that of the duodenum.

9433 A STUDY OF THE SERUM-MUCOSAL TRANSFER OF UREA IN THE INTESTINE OF PATIENTS WITH CHRONIC UREMIA. (Fr.) Sraer, J.-C. (Tenon Hosp., Paris), J.-C. Rambaud, J.-J. Bernier and G. Richet. *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):211-218, 1971.

Ten patients with chronic renal insufficiency underwent double catheter intubation of the duodenum (1 of 10), jejunum (6 of 10) or ileum (3 of 10), using 4 different perfusates. Each contained saline and polyethylene glycol, plus 1 of the possible combinations of glucose or lactose with calcium or magnesium chloride. Urea concentrations were significantly higher in the jejunum and duodenum, as compared to the ileum. The ratio of the urea concentration in intestinal fluid to its serum concentration at the same site was 0.80 in the central and lower portions of the jejunum, 0.65 and 0.55 in the lower jejunum and duodenum, resp.; 0.17 in the ileum, with virtually no evidence of transfer in the lower portion of the ileum. The flux of both urea and intestinal fluid varied in similar fashion. It is concluded that the serum-mucosal transfer of urea in the small intestine was directly related to both its serum concentration at a given site and the net flux of intestinal fluid at that same site. The net flux of intestinal fluid, in turn, appeared to be essentially dependent on the transfer of sugars: for example, it was greatest (and the net transfer of urea was greatest) at sites in the jejunum where malabsorption of lactose from the perfusate was demonstrated.

9434 INTUSSUSCEPTION IN A COMMUNITY HOSPITAL. A REVIEW OF FIFTY CASES. (E.) Kerry, R. L. (St. Joseph Mercy Hosp., Ann Arbor, Mich.). *Am. J. Surg.* 122(4):536-539, 1971.

9435 AN INTERESTING CASE OF INTESTINAL OBSTRUCTION. (E.) Daftary, M. (U. Isfahan Sch. Med., Iran) and A. A. Khan. *J. Abdom. Surg.* 13(7):161-162, 1971.

9436 STATISTICS ON SURGICALLY LOCALIZED ILEUM. (Ger.) Giehl, H. J. (Altstadt Reg. Hosp., Magdeburg, Germany). *Zentralbl. Chir.* 96(32):1092-1104, 1971.

9437 THE CLINICAL, RADIOLOGICAL AND OPERATIVE DIAGNOSIS OF THE DIFFICULT DUODENAL STUMP. (Sp.) Deschamps, J. H. (Sch. Med. Sci., La Plata, Argentina), A. Gallesio and S. Platini. *Prensa Med. Argent.* 58(15):783-785, 1971.

9438 A SIMPLIFIED TECHNIC OF HYPOTONIC DUODENOGRAPHY. (Sp.) Rainoldi, J. L. (Sch. Med. Sci., Rosario, Argentina) and I. Palonsky. *Prensa Med. Argent.* 58(14):730-733, 1971.

9439 INTESTINAL OBSTRUCTION FOLLOWING UROLOGIC OPERATIONS. (Pol.) Korzycki, J. (Med. Acad. 1st Surg. Clin., Lodz, Poland) and L. Jeromin. *Pol. Przegl. Chir.* 43(6A):1001-1006, 1971.

9440 GASTRODUODENAL TUBERCULOSIS. (Fr.) Leng Levy, J., J. Aubertin and B. Leng. *Bordeaux Med.* 4(4):1033-1052, 1971.

9441 NEONATAL NECROTIZING ENTEROCOLITIS: OLD PIT FALL OR NEW PROBLEM? (E.) Fetterman, G. H. (Child. Hosp., Pittsburgh, Pa.). *Pediatrics* 48(3):345-348, 1971.

9442 A RADIOLOGICAL AND CLINICAL STUDY OF DUODENAL DIVERTICULUM. (Jap.) Kurokawa, S. (Univ. Sch. Med., Niigata, Japan). *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 31(3):241-252, 1971.

9443 A REVIEW OF 22 CASES OF PRIMARY CARCINOMA OF THE SMALL INTESTINE. (It.) Vasario, U. (Maggiore Hosp., San Giovanni Battista, Italy), F. Giordanengo, A. Oliaro and V. Simonetti. *Minerva Chir.* 26(12):653-666, 1971.

9444 GASTRODUODENAL INTERPOSITION OF A SEGMENT OF THE JEJUNUM. (Por.) De Araujo Teixeira, A. M. (Sch. Med., Porto, Portugal). *Medico (Porto)* 59(1031):801-821, 1971.

9445 NECROTIZING ENTERITIS. (E.) Mukherjee, A. P. (U. Malaya Dept. Med., Kuala Lumpur), W. C. Foong and B. R. Ferguson. *Med. J. Malaya* 25(4):285-287, 1971.

9446 PROBLEMS OF DIAGNOSIS IN JEJUNAL FIBROMYOMA (CASE REPORT). (Rum.) Nicolaescu, T., E. Bittman and S. Schiau. *Med. Interna (Bucur.)* 23(5):627-632, 1971.

9447 PEUTZ-JEGHERS SYNDROME. (Hun.) Simonyi, I., J. Horvath and T. Balazs. *Magy. Belorv. Arch.* 24(1):19-22, 1971.

9448 INTESTINAL OBSTRUCTION SIMULATING ACUTE INFECTIOUS DISEASES. (Rus.)

Rozanov, B. S. *Khirurgiia (Mosk.)* 47(7):4-10, 1971.

9449 LACTOBACILLUS CASEI TABLETS IN THE TREATMENT OF INTESTINAL INFECTION. (E.) Alexander, J. G. (Roy. Infirm., Hull, England). *J. R. Coll. Gen. Practit.* 21(111):623-624, 1971.

9450 FAMILIAL MULTIPLE LEVEL INTESTINAL ATRESIAS: REPORT OF TWO SIBLINGS. (E.) Mishalany, H. G. (American U. Beirut Sch. Med., Lebanon) and V. M. Kaloustian. *J. Pediatr.* 79(1):124-125, 1971.

9451 DUODENAL ANGIOSARCOMA. (Sp.) Flores, M. R. *Dia Med.* 43(17):409-410, 1971.

9452 THE SHORT GUT SYNDROME. PATHOPHYSIOLOGY AND TREATMENT. (E.) Wright, H. K. (Yale U. Sch. Med., New Haven, Conn.) and M. D. Tilson. *Curr. Probl. Surg.* 51(6):1-51, 1971.

9453 ATRESIA OF THE SMALL INTESTINE. (Fr.) Bondonny, J. M. (Pediatr. Hosp., Bordeaux, France), J. Lasserre and I. Strzelecki. *Ann. Chir. Infant.* 12(3):231-237, 1971.

9454 A PSEUDO PEUTZ JEGHERS SYNDROME: JUVENILE POLYPOSIS OF THE JEJUNUM IN A GIRL AGED 10. (Fr.) Gruner, M. (Trousseau Hosp., Paris), J. C. Gueriot and E. Boccon Gibod. *Ann. Chir. Infant.* 12(3):189-196, 1971.

9455 ON THE TECHNIQUE OF SMALL INTESTINE BIOPSY BY A SUCTION BIOPSY CATHETER INTRODUCED RECTALLY. (Ger.) Deyhle, P. (U. Med. Clin., Erlangen, Germany), H. Koch and M. Classen. *Dtsch. Med. Wochenschr.* 96(31):1272-1275, 1971.

9456 ATRESIAS OF THE SMALL INTESTINE. (Fr.) Daudet, M. (Edouard Herriot Hosp., Lyon, France), A. Pichon, J. P. Chappuis and M. Crouzet. *Cah. Med. Lyon.* 47(22):2395-2417, 1971.

9457 LEIOMYOSARCOMA OF THE DUODENUM. (E.) McBrien, M. P. (St. Peter's Hosp., Chertsey, England) and P. E. M. Jarrett. *Br. J. Surg.* 58(9):685-689, 1971.

9458 HIGH ILEUS OF THE SMALL INTESTINE CAUSED BY LYMPHOGRANULOMATOSIS OF THE RETROPERITONEAL LYMPH NODES. (Rus.) Krysko, V. T. *Zdravookhr. Beloruss.* 17(6):79, 1971.

9459 CAUSES OF LATE ADMISSION TO HOSPITAL OF PATIENTS WITH INCARCERATED HERNIAE. (Rus.) Kovalev, D. N. *Zdravookhr. Beloruss.* 17(6):41-44, 1971.

9460 ANGIOGRAPHIC DIAGNOSIS OF INTESTINAL BLEEDING. (Slovene) Stropnik, J. (Inst. Roentgenol., Ljubljana, Yugoslavia) and I. Obrez. *Zdrav. Vestn.* 40(7-8):283-287, 1971.

9461 THE CLINICAL SYMPTOMATOLOGY OF INTUSSUSCEPTION IN CHILDREN. (Ger.) Muhlbacher, I. (Pediatr. Hosp., Linz, Austria). *Wien. Med. Wochenschr.* 121(33-35):601-604, 1971.

9462 ILEUS DUE TO ILEOCECAL INTUSSUSCEPTION CAUSED BY LIPOMA WITH COEXISTENCE OF MECKEL'S DIVERTICULUM. (Pol.) Formejster, I. (Wagrowiec Hosp., Poland) and R. Mattern. *Wiad. Lek.* 24(11):1101, 1971.

9463 CONDITION OF THE SMALL INTESTINE IN CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER. (Rus.) Iakhontova, O. I. and L. N. Valenkevich. *Ter. Arkh.* 43(6):69-73, 1971.

9464 MECHANICAL INTESTINAL OBSTRUCTION IN THE EARLY POSTOPERATIVE PERIOD FOLLOWING GASTRIC RESECTION. (Rus.) Gritsman, I. I., I. L. Rozanov and I. I. Iudin. *Sov. Med.* 34(7):82-85, 1971.

9465 JEJUNAL DIVERTICULOSIS. (E.) Goldowsky, S. J. and E. Sharp. *RI Med. J.* 54(8):413-416, 1971.

9466 INTESTINAL RADIATION EFFECT. RADIATION INJURY TO THE SMALL INTESTINE: REPORT OF ONE CASE WITH OBSTRUCTION THIRTY YEARS AFTER TREATMENT. (E.) Cauble, W. G. (Wesley Med. Cent., Wichita, Kans.) and R. Page. *J. Kans. Med. Soc.* 72(9):390-382, 1971.

9467 ISCHEMIC JEJUNITIS CAUSED BY THROMBOSIS OF THE SUPERIOR MESENTERIC ARTERY. (Dut.) De Schepper, A. (Stuivenberg Gen. Hosp., Antwerp, Belgium). *J. Belge Radiol.* 54(5):651-659, 1971.

9468 HENOCH SCHONLEIN'S PURPURA: A REPORT OF TWO CASES WITH ROENTGENOGRAPHIC FINDINGS OF THE SMALL INTESTINE. (E.) Vaeusorn, N. (Siriraj Hosp., Bangkok, Thailand), S. Angkeow, C. Kaewjinda and V. Somboonvit. *Siriraj Hosp. Gaz.* 23(5):550-556, 1971.

9469 A CASE OF ACUTE ABDOMEN IN A CHILD: INTESTINAL INTUSSUSCEPTION. (Sp.) Garrido Lestache Diaz, J. (Nino Jesus Hosp., Madrid). *Riv. Chir. Pediatr.* 13(2):133-152, 1971.

9470 PRIMARY MALIGNANT TUMOURS OF THE SMALL INTESTINE. ANALYSIS OF CASES DIAGNOSED IN FINLAND, 1953-1962. (E.) Vuori, J. V. A. (U. Turku Dept. Surg., Finland). *Acta Chir. Scand.* 137(6):555-561, 1971.

See also numbers: 9117, 9207, 9212, 9216, 9328, 9362, 9366, 9391, 9393, 9408, 9412, 9413, 9418, 9535, 9551, 9782, 9839

REGIONAL ENTERITIS

9471 THE PRESENCE OF INFLAMMATORY LEUCOCYTES IN THE RECTAL MUCUS OF PATIENTS WITH REGIONAL ILEITIS. (E.) Riis, P. (Gentofte Hosp., Hellerup, Denmark) and P. Anthonisen. *Scand. J. Gastroenterol.* 6(8):719-721, 1971.

Cytological imprints of the rectal mucus were taken from 30 patients with Crohn's disease of the small intestine without colonic involvement to determine if the inflammatory process in the terminal ileum was reflected in the rectal mucus by the presence of inflammatory WBC. Two-thirds of the patients with regional ileitis showed significant numbers of inflammatory cells in the mucosal layer by the first diagnostic contact. By including follow-up examinations, this number increases to three-quarters. The dominating cells were neutrophils, with few lymphocytes and practically no basophils, eosinophils, or RBC. While the cells were often collected in strands, an even distribution was also seen. Thus a positive result may be an important indicator of organic disease in proximal portions of the intestinal tract.

9472 ABSORPTION STUDIES IN PATIENTS WITH CROHN'S DISEASE AND IN PATIENTS WITH ULCERATIVE COLITIS. (E.) Andersson, H. (Sahlgrens Hosp., Gothenburg, Sweden), G. Dotevall, R. Gillberg, R. Jagenburg and N. G. Kock. *Acta Med. Scand.* 190(5):407-410, 1971.

Of 50 patients with Crohn's disease only 1 had an abnormally low D-xylose absorption value; in 21 patients with ulcerative colitis borderline values were found in 4. In all patients (21) with extensive Crohn's disease, fecal fat excretion exceeded 18 g/72 hr and in 2/3 of them values of more than 30 g/hr were noted. Fifty percent of both patients with small lesions in the terminal ileum and those with ulcerative colitis had an excretion above 18 g/72 hr. A decreased vitamin B_{12} absorption was common in patients with Crohn's disease. In patients with ulcerative colitis, 40% had borderline values. About half the patients with Crohn's disease and one-fourth of those with ulcerative colitis had serum folate values below 3 mg/ml.

9473 NEW ASPECTS OF THE TREATMENT OF CROHN'S DISEASE. (Fr.) Geffroy, Y. (Charles Nicolle Hosp., Rouen, France), R. Colin and P. Hecketsweiler. *Rev. Prat. (Paris)* 21(15): 2599-2612, 1971.

9474 THE EARLY AND LATE RESULTS OF SURGICAL TREATMENT FOR CROHN'S DISEASE. (E.) De Dombal, F. T. (Gen. Infirm., Leeds, England), I. Burton and J. C. Goligher. *Br. J. Surg.* 58(11):805-816, 1971.

9475 GASTRIC ACID SECRETION IN CROHN'S DISEASE IN RELATION TO DISEASE ACTIVITY AND BOWEL RESECTION. (E.) Fielding, J. F. (Gen. Hosp., Birmingham, England), W. T. Cooke and J. A. Williams. *Lancet* 1(7709):1106-1108, 1971.

9476 REGIONAL ILEITIS. (Fr.) Girona, G. C., B. Bonneville and J. Miguet. *Grenoble Med. Chir.* 9(10):363-370, 1971.

9477 DUODENOCOLIC FISTULA AFTER RIGHT-SIDED HEMICOLECTOMY FOR CROHN'S REGIONAL ENTERITIS. (Ger.) Zehender, K. (Ruhr U. Essen Clin., Bochum, Germany) and H. B. Makoski. *Chirurg* 42(8):375-377, 1971.

9478 SARCOIDOSIS AND CROHN'S DISEASE. (E.) Mitchell, D. N. (Brompton Hosp., London) and R. J. W. Rees. *Proc. R. Soc. Med.* 64(9):944-946, 1971.

See also numbers: 9521, 9546, 9582

9479 ABDOMINAL LYMPHOMA PRESENTING WITH MALABSORPTION. (E.) Novis, B. H. (Groote Schuur Hosp., Cape Town, South Africa), S. Bank, I. N. Marks, G. Selzer, L. Kahn and R. Sealy. *Q. J. Med.* 40(160):521-540, 1971.

Clinical features, hematology, biochemistry, absorptive functions, radiologic and histological features of 23 cases of abdominal lymphoma presenting with malabsorption are presented. Diarrhea was seen in all cases and steatorrhea was observed in 21 of 23 patients. Finger clubbing and peripheral edema were present in 50% of patients; hepatomegaly, splenomegaly and abdominal masses were not significant features. Hematology revealed mild anemia, elevated RBC sedimentation rate (only above 30 mm), leukocytosis, and an occasional megaloblastic bone marrow. D-Xylose absorption was abnormal in 12 of 15, glucose tolerance was flat in 8 cases, and hypoalbuminemia was common (14/21 cases). Radiology demonstrated a non-specific diffuse malabsorption pattern in 13, local infiltrative changes with thickened mucosal folds and nodules in 2 cases, and a combination of the above in 4 cases. Peroral jejunal biopsies were diagnostic in one-third, suggestive in one-third, and normal in one-third of patients with malabsorption due to lymphoma. There were findings of total or partial villous atrophy, combined with plasma cell transformation in the lamina propria.

9480 THE ACTIVITY OF THREE DIFFERENT SMALL-INTESTINAL β-GALACTOSIDASES IN ADULTS WITH AND WITHOUT LACTASE DEFICIENCY. (E.) Asp, N.-G. (Univ. Hosp., Lund, Sweden), N. O. Berg, A. Dahlqvist, J. Jussila and H. Salmi. *Scand. J. Gastroenterol.* 6(8):755-762, 1971.

Small intestinal mucosal biopsies from 19 individuals with specific lactose malabsorption and 16 controls were assayed for the 3 different β-galactosidases. There was no significant difference in any of the disaccharidases (maltase, isomaltase, sucrase, and trehalase) between the deficiency group and the control group. Brush border lactase was clearly demonstrable in all lactase-deficient subjects studied. The enzyme activity was 10% that in controls; however, the properties of the enzyme were similar to those of the brush border lactase in controls. While both acid β-galactosidase and hetero β-galactosidase activities were somewhat decreased in lactase-deficient subjects when compared with controls, these differences were not significant. The frequency distribution histogram of hetero β-galactosidase activities indicated a rather normal distribution in both the deficiency group and the controls and does not suggest that low values belong to a separate population. The acid β-galactosidase was also shown to have lactase activity in vitro at pH 6. The possible existence of additional brush border galactosidases could not be excluded.

9481 STEATORRHEA IN PATIENTS WITH LIVER DISEASE. (E.) Williams, C. N. (Dalhousie Clin. Res. Ctr., Halifax, Nova Scotia, Canada) and J. J. Sidorov. *Can. Med. Assoc. J.* 105(11): 1143-1146, 1971.

The incidence of steatorrhea among 23 consecutive patients with liver disease was 78.3%. Steatorrhea was defined as stool fat higher than 6 g/day. The liver disease was classified by clinical history, physical findings, abnormal function tests (SGOT, prothrombin, albumin globulin values, bilirubin, alkaline phosphatase), and liver biopsy. The 18 cases with steatorrhea plus 2 earlier cases of infectious hepatitis were analyzed. The 20 patients were divided into 7 groups by diagnosis. The malabsorption was confined to fat and fat-soluble vitamins. No histological abnormality was seen on jejunal biopsy; there were no radiological findings associated with malabsorption and there was no diarrhea. The D-xylose and Schilling tests gave normal values. Steatorrhea is a defect that is associated with a variety of liver diseases and is not attributed to a small intestine defect. A micellar phase defect with a reduced concentration of total conjugated bile salts is postulated as a mechanism for the steatorrhea.

9482 MALABSORPTION IN RHEUMATOID DISEASE. (E.) Dyer, N. H. (Queen Elizabeth Hosp., Birmingham, England), M. J. Kendall and C. F. Hawkins. *Ann. Rheum. Dis.* 30(6):626-630, 1971.

Serum albumin and serum folate were depressed in 32 and 74%, resp., of 28 rheumatoid arthritic patients; serum cholesterol and serum vitamin B_{12} were normal in all subjects. Hemoglobin, serum calcium and serum iron were decreased in 14, 7, and 23 patients, resp.; the iron-binding capacity was not raised in any and was less than 250 µg/100 ml in two-thirds- a feature of many chronic inflammatory disorders. A low xylose excretion occurred in 23%, which was due to renal impairment in half of the cases. Of 15 patients studied, 6 excreted more than 5 g/24 hr and 3 more than 7 g/24 hr. Vitamin-B_{12} absorption and intestinal histology were uniformly normal. Serum alkaline phosphatase was elevated in 25% and 5-nucleotidase was raised in 17%; abnormal BSP retention at 45 min occurred in 40%. The cause of the malabsorption in this small group of rheumatoid patients is uncertain.

9483 INTESTINAL LACTASE DEFICIENCY. DIAGNOSIS BY ROUTINE UPPER GASTROINTESTINAL RADIOGRAPHY. (E.) Rosenquist, C. J. (Stanford U. Med. Ctr., Calif.), J. W. Heaton, Jr., G. M. Gray and F. F. Zboralske. *Radiology* 102(2):275-277, 1972.

A routine upper gastrointestinal series was done in 260 consecutive patients who had received 16 ounces of colloidal barium to which 50 g of lactose had been added. In addition to the routine study, a '30-min' film was taken 45-60 min after ingestion of barium. All 3 of Laws' criteria were required for a diagnosis of lactase deficiency: dilatation of the small intestine; apparent dilution of the barium-lactose mixture in the small intestine; and transit of the mixture to the colon on the '30-min film'. Peroral small-intestine biopsy of the proximal jejunum was performed on patients with positive radiographic studies; 2 refused biopsy but had a p.o. lactose tolerance test; 2 others refused all studies. Of the 260 patients, 15 (6%) showed radiographic features of lactase deficiency. The diagnosis was confirmed by enzyme analysis of the small-intestine mucosa in 9 of 11 patients who were biopsied, while 2 others had normal enzyme levels. Two patients who refused biopsy had positive oral lactose tolerance tests. Previous gastric surgery had been performed in 5 of the 15 (Billroth II gastrojejunostomy in 4, gastroenterostomy in 1), and the diagnosis was substantiated by lactose tolerance tests in 1 while 2 had a normal biopsy, and the other 2 refused further testing (both with strong histories suggestive of lactase deficiency). None of the 11 with proved lactase deficiency were previously aware that symptoms were produced by milk ingestion, but 5 of these drank little or no milk. Compared with 245 controls, there was a nonsignificant increase in the incidence of alcoholism among the 11 with positive studies (36%) compared with 43 of 245 (18%) of the patients with normal radiographic studies.

9484 ULTRASTRUCTURE OF SMALL INTESTINE EPITHELIUM IN WHIPPLE'S DISEASE. (Ger.) Otto, H. F. (U. Hamburg Pathol. Inst., Germany). *Virchows Arch.* [*Pathol. Anat.*] 351(2):142-154, 1970.

In addition to the typical stromal changes, structural alterations in the surface epithelium (enterocytes, undifferentiated and "clear", Paneth and enterochromaffin cells) were observed during treatment (antibiotics, ACTH, sulfapyridine) of 2 patients with Whipple's disease. These included invagination and segmentation of nuclei, swelling of mitochondria, increase in mitochondrial granules, hyperplasia of Golgi fields and vesiculation of endoplasmic reticulum in enterocytes, hyperplasia of Golgi fields and increased nuclear activity in undifferentiated and "clear cells", hyperplasia of Golgi apparatus and secretory-like cytoplasmic inclusions in Paneth cells and proliferation with increased secretory activity of enterochromaffin cells. It is suggested that epithelial changes seen in treated and untreated cases of Whipple's disease are the result of stromal alterations. Therapy induces bacteriostasis and bacteriolysis and with it normalization of lymphatic drainage and of capillary circulation in villi which, in turn, leads to a re-establishment of a normal epithelium. It is concluded that the above structural changes are an expression, not of epithelial degeneration, but of increased metabolic activity.

9485 BIOCHEMICAL AND IMMUNOCHEMICAL DEMONSTRATION OF ISOENZYMES AND THE M FORM OF LACTATE DEHYDROGENASE IN JEJUNAL BIOPSIES OF CELIAC SPRUE SUBJECTS. (Cz.) Fric, P. (Charles U. Sch. Med., Prague), O. Fricova and Z. Lojda. *Cesk. Gastroenterol. Vyz.* 25(6):233-239, 1971.

9486 PRESENT STATUS OF SUBCLINICAL INTESTINAL MALABSORPTION IN THE TROPICS. (E.) Falaiye, J. M. (U. Lagos Coll. Med., Nigeria). *Br. Med. J.* 4(5785):454-458, 1971.

9487 DISORDERS OF GLUCOSE METABOLISM IN THE ADULT. (Fr.) Monges, A., B. Granjon and J. C. Tronconi. *Rev. Fr. Diet.* 15(57):36-41, 1971.

9488 ON THE BASIS OF CEREBRAL LESIONS IN WHIPPLE'S DISEASE. (E.) Kodousek, R. (Palacky U. Sch. Med., Olomouc, Czechoslovakia) and Z. Kojecky. *Rev. Czech. Med.* 17(3):137-143, 1971.

9489 DISTURBANCES IN CHOLESTEROL METABOLISM IN MALABSORPTION SYNDROME. (E.) Mehta, G. S. (Med. Coll., Jabalpur, India). *Punjab Med. J.* 20(9):327-331, 1971.

9490 THE INTESTINAL MALABSORPTION SYNDROME. PATHOPHYSIOLOGY AND TREATMENT. (Sp.) De Prado Isla, L. H. (Jose San Martin Hosp., Buenos Aires, Argentina) and H. Lopez. *Prensa Med. Argent.* 58(11):544-555, 1971.

9491 CONGENITAL GLUCOSE GALACTOSE MALABSORPTION. REPORT OF A CASE WITH IN VITRO STUDY OF INTESTINAL ABSORPTION AND DETERMINATION OF THE TmG. (Fr.) Beauvais, P. (Trousseau Hosp., Paris), G. Vaudour and J. F. Desjeux. *Arch. Fr. Pediatr.* 28(6):573-591, 1971.

9492 MILK INTOLERANCE IN INFANTS. (E.) Praharaj, K. C. (MKCG Med. Coll., Berhampur, India). *Antiseptic* 68(7):495-501, 1971.

9493 IRON DEFICIENCY ANEMIA OF INFANCY. CONSIDERATIONS ON MALABSORPTION AND PREVENTION. (It.) Barbieri, A. M. (U. Naples Inst. Pediatr., Italy) and N. De Cicco. *Pediatria (Napoli)* 79(2):215-226, 1971.

9494 AN ATTEMPT AT EVALUATING THE INCIDENCE AND ROLE OF DISSACHARIDE INTOLERANCE IN THE PATHOGENESIS OF CHRONIC DIARRHEA IN CHILDREN. (Pol.) Zychowicz, C. (Pediatr. Hosp., Olsztyn, Poland) and K. Janukowicz. *Pediatr. Pol.* 46(5): 561-567, 1971.

9495 COW'S MILK (LACTOSE?) INTOLERANCE AMONG INDONESIAN DOCTORS OF THE DR. TJIPTO MANGUNKUSUMO GENERAL HOSPITAL AND MEDICAL SCHOOL UNIVERSITY OF INDONESIA. (E.) Sutedjo (U. Indonesia Med. Sch., Jakarta). *Pak. Pediatr. J.* 1(3-4):53-56, 1971.

9496 QUANTITATIVE DETERMINATION OF IgE FOR ELUCIDATION OF THE SIGNIFICANCE OF ALLERGIC REACTIONS IN CELIAC DISEASE. (Ger.) Mietens, C. (Univ. Pediatr. Clin., Wurzburg, Germany) and S. G. O. Johansson. *Monatsschr. Kinderheilkd.* 119(7):332-333, 1971.

9497 UNIQUE ANTIBODY TO BASEMENT MEMBRANE IN PATIENTS WITH SELECTIVE IgA DEFICIENCY AND COELIAC DISEASE. (E.) Ammann, A. J. (U. California San Francisco Med. Ctr.) and R. Hong. *Lancet* 1(7712):1264-1268, 1971.

9498 IMPAIRED IgA RESPONSES IN CELIAC DISEASE. (E.) Beale, A. J. (Hammersmith Hosp., London), W. E. Parish, A. P. Douglas and J. R. Hobbs. *Lancet* 1(7711):1198-1199, 1971.

9499 CONGENITAL SACCHARASE INSUFFICIENCY. (Hun.) Kiss, P. (Ujpesti Hosp., Budapest) and I. Szanyi. *Gyermekgyogyaszat* 22(2):257-261, 1971.

9500 DECREASED DUODENAL MONOAMINE OXIDASE ACTIVITY IN COELIAC DISEASE. (E.) Challacombe, D. N. (Roy. Hosp. Sick Child., London), M. Sandler and J. Southgate. *Arch. Dis. Child.* 46(246):213-215, 1971.

9501 THE DEMONSTRATION OF PRECIPITATING ANTIBODIES IN AQUEOUS EXTRACTS OF FLOUR IN COELIAC DISEASE. (Ger.) Rossipal, E. (Univ. Pediatr. Clin., Graz, Austria). *Z. Kinderheilkd.* 110(3) 188-199, 1971.

9502 LIPOMATOSIS OF THE PANCREAS AS A CAUSE OF MALABSORPTION. (Dan.) Hjortshoj, A. (Community Hosp., Aarhus, Denmark). *Ugeskr. Laeger* 133(31):1509-1512, 1971.

9503 MALABSORPTION AND GASTRIC SURGERY. A REPORT OF TWO CASES OF PREEXISTING MALABSORPTION SYNDROME PRECIPITATED BY PARTIAL GASTRECTOMY. (Nor.) Fausa, O. (Natl. Hosp., Oslo, Norway). *Tidsskr. Nor Laegeforen.* 91(16): 1217-1219 & 1250, 1971.

9504 MEDIUM CHAIN TRIGLYCERIDES: A MODERN THERAPY IN MALABSORPTION SYNDROMES. (Ger.) Egger, G. (Univ. Med. Clin., Bern, Switzerland). *Praxis* 60(31):1027-1030, 1971.

9505 SPRUE LIKE SYNDROME AND MALIGNANT LYMPHOMA. CASE PRESENTATION. (It.) Tura, S. (U. Bologna Inst. Semeiot. Med., Italy), G. Martinelli and P. R. Dal Monte. *Haematologica* 55(10):663-665, 1970.

9506 MALABSORPTION SYNDROMES AND NEOPLASMS OF THE RETICULOENDOTHELIAL SYSTEM. (It.) Labo, G. (Univ. Clin., Bologna, Italy), G. Gasbarrini and F. Miglio. *Haematologica* 55(10):659-662, 1970.

9507 110 CHILDREN WITH COELIAC DISEASE, 1950 TO 1969. (E.) Young, W. F. (Queen Elizabeth Hosp. Children, London) and E. M. Pringle. *Arch. Dis. Child.* 46(248):421-436, 1971.

See also numbers: 9089, 9200, 9877, 9878

9508 MULTIPLE ADENOCARCINOMAS OF THE COLON AND RECTUM. (E.) Travieso, C. R., Jr., L. F. Knoepp, Jr. (Alton Ochsner Med. Found., New Orleans, La.) and P. H. Hanley. *Dis. Colon Rectum* 15(1):1-6, 1972.

The records of 2230 patients with carcinoma of the colon or rectum who were admitted to Charity Hospital between 1948 and 1966 were reviewed to determine the number of patients with multiple adenocarcinomas. Of these 275 (12%) had 2 primary carcinomas, while 92 (4.1%) had second primary carcinomas in the colon or rectum, and 47 (2.1%) had multiple discrete invasive adenocarcinomas of the colon or rectum. Thirteen patients (0.5%) had multiple metachronous adenocarcinomas and 34 (1.6%) had multiple synchronous adenocarcinomas. Of these 34 patients, 28 had resection for palliation or cure, 3 had lesions that were not resectable, and 3 patients were not operated upon. Five of the 34 patients (15%) survived free of tumor for 5 yr. In the diagnosis of multiple synchronous adenocarcinomas, both lesions were found before surgery in 9 patients (26%), the second lesion was found at surgery in 19 (56%), and the rest were unresectable, found at autopsy or missed and found subsequently. The usefulness of preoperative diagnostic studies including barium enemas and proctoscopy is stressed.

9509 MEGACOLON IN TEEN-AGED AND ADULT PATIENTS. (E.) Ponka, J. L. (Henry Ford Hosp., Detroit, Mich.), C. Grodsinsky and B. E. Brush. *Dis. Colon Rectum* 15(1):14-22, 1972.

In all 3 male patients (16, 19 and 21 yr old), the onset occurred during the neonatal period, while in the female patient (16 yr old), the megacolon began at 14 yr of age. Biopsy specimens revealed an absence of ganglion cells in all 3 male patients and a decreased number of ganglion cells in the female. All 3 males suffered from encopresis while the female patient did not, but all 4 were severely constipated. All four patients underwent the Swenson pull-through procedure with excellent results. Postoperative barium-enema studies and proctoscopic examinations of the patients revealed that the size of the lower colons was normal in all cases, sphincter tone was normal, and water intoxication was not encountered. One male patient is now the father of 2 girls, both of whom have aganglionic megacolon.

9510 FAMILIAL POLYPOSIS IN CHILDREN. (E.) Peck, D. A. (Santa Clara Valley Med. Ctr., San Jose, Calif.), K. S. Watanabe and H. W. Trueblood. *Dis. Colon Rectum* 15(1):23-29, 1972.

Three children with familial polyposis are reported and the literature regarding familial polyposis in children is reviewed. Two of the children (siblings, 7 and 9 yr old) were treated by colectomy and ileoproctostomy with preservation of the ileocecal valve to prevent backwash of rectal content into the terminal ileum. In the third patient (7 yr old) colectomy and ileoproctostomy is planned. In the 2 operated cases residual rectal polyps remitted spontaneously. Eleven cases of carcinoma complicating familial polyposis in children 16 yr old or younger have been recorded in the literature. Thus, in children with polyposis, carcinoma may cause death before the age of 16 yr. Management in childhood should include prompt colectomy due to the occurrence of carcinoma as a possible complication; the hazard of carcinoma in the retained rectum is minimal in children.

9511 SIGMOIDOVAGINAL AND CECOVAGINAL FISTULA AS A COMPLICATION OF PERIDIVERTICULITIS: REPORT OF EIGHT CASES. (E.) Bacon, H. E. (Philadelphia, Pa.), S. T. Ross and P. Malvar. *Dis. Colon Rectum* 15(1):41-48, 1972.

All eight patients had histories of escape of flatus and/or fecaloid discharge, 5 had had abdominal pain or discomfort for various lengths of time, and 4 complained of intermittent progressive pain. Two patients could feel abdominal masses. Proctosigmoidoscopy was helpful in 3 cases and diagnostic in 2, while fistulograms were diagnostic in 6 cases and not done in 2. Barium enema studies suggested fistula formation in 4 cases and provided confirmatory evidence in 3. Total colectomy with rectal anastomosis was performed in 1 case, right hemicolectomy in another, left hemicolectomy in 3, rectosigmoidectomy in 2, and a 4-stage operation in 1. The results indicate that closure of the vaginal fistula is not necessary, while adequate drainage is of utmost importance. Flushing of the pelvis and abdomen with warm physiologic saline, the use of stump drainage (plastic) and at least 3 Penrose drains, and intra-abdominal instillation of antibiotics proved most rewarding. No postoperative deaths were observed in this series, although 1 developed atelectasis, another transient ileus, and a third cystitis.

9512 COLONIC LYMPHANGIECTASIA: REPORT OF TWO CASES. (E.) Griffen, W. O., Jr. (U. Kentucky Coll. Med., Lexington), R. P. Belin, R. W. Furman, A. Lieber, J. W. Schaefer and L. D. Dubilier. *Dis. Colon Rectum* 15(1):49-54, 1972.

Both patients were 55 yr old and admitted excessive alcohol intake. Both had profound weakness and severe hypokalemic alkalosis accompanying watery diarrhea. While the rectal fluid did not contain significant amounts of protein, both had hypoalbuminemia with dependent edema. The high potassium content of each random fecal sample suggested that this entity is a true potassium-wasting enteropathy. In both cases the symptoms of diarrhea and potassium loss were relieved by partial colectomy involving the portion of the sigmoid colon which barium enema studies revealed to be involved to the greatest extent.

9513 ENDOSCOPIC LIGATION TREATMENT OF COLONIC POLYPS. (E.) Cullen, P. K., Jr. (Sansum Med. Clin., Santa Barbara, Calif.) and J. P. Nesselrod, Sr. *Dis. Colon Rectum* 15(1): 30-32, 1972.

A method of endoscopic ligation as treatment of colonic polyps which allows for total removal without complications or disability is described. Two rubber bands are placed on the drum of the polyp ligator, the polyp is grasped and worked through the drum of the ligator, and the rubber bands are released gently so as not to "fire them off". Polyps too large to be worked into the drum can be fragmented in a similar manner, utilizing the rubber bands, until 2 can be placed on the pedicle. The polyp and portion of the stalk are then removed with either a cold or a hot snare. The rubber bands afford complete and lasting hemostasis, and they slough away in 5-10 days, leaving a whitish factitial ulcer which epithelializes in 2 weeks. Fifty polyps ranging from 9.0-2.5 cm in size and located in the distal 40.0 cm of the colon have been removed with this technique without complications.

9514 ECTOPIC GASTRIC MUCOSA AND GLANDULAR TISSUE OF A SALIVARY TYPE IN THE ANAL CANAL CONCOMITANT WITH A DIVERTICULUM IN HEMORRHOIDAL TISSUE: REPORT OF A CASE. (E.) Shindo, K., H. E. Bacon (Temple U. Med. Ctr., Philadelphia, Pa.) and E. J. Holmes. *Dis. Colon Rectum* 15(1): 57-62, 1972.

The case of a 24-yr-old male with aberrant gastric and salivary glands in the anal epithelium is reported. The patient presented with severe bleeding by rectum of sudden onset, protrusion, and anal pain. Examination revealed large external and internal hemorrhoids and considerable spasm of the sphincter. Sigmoidoscopy, palpation of the abdomen, barium enema studies, and oral cholecystographic studies disclosed no abnormalities. An anal diverticulum and scoliosis of the lumbosacral spine were also noted. Seven days after admission routine hemorrhoidectomy was performed, and histological studies revealed normal looking gastric-type mucosa of the acid-secreting type, and a microfocus of mixed serous and mucus glands such as are found normally in the submaxillary glands, and hemorrhoids.

9515 GARDNER'S SYNDROME. SPONTANEOUS DISAPPEARANCE OF RECTAL POLYPS AFTER SUBTOTAL COLECTOMY. (Fr.) Lambilliotte, J. P. (St. Pierre U. Hosp., Brussels), J. Belenger, E. Jacobs and A. Bremer. *Acta Gastroenterol. Belg.* 34(7):562-572, 1971.

A 33-yr-old man presented with generalized polyposis of the colon, sigmoid and rectum, accompanied by 2 benign, mesenchymatous tumors of the mesentery, an adenocarcinoma of the sigmoid, an osteoma of the ethmoid bone and a polyp of the maxillary sinus. Following total colectomy (except for amputation of the rectum) plus terminolateral ileoproctostomy, the rectal polyps underwent spontaneous, complete regression. At the time of report, 3 yr after the colectomy and 2 and one-half yr after surgical excision of a benign fibro-osteochondroma of the knee, the patient was in excellent health, with no evidence of recurrence or metastasis.

9516 A MALIGNANT MUCOCELE OF THE APPENDIX. (Fr.) Moreaux, L. (Civil Hosp., Chatelet, Belgium), E. Schyns, M. Fievez and C. Fievez. *Acta Gastroenterol. Belg.* 34(8-9):627-632, 1971.

A 54-yr-old woman presented with an adenocarcinomatous mucocele of the appendix, infiltrating the retroperitoneal region, 1 ovary, the uterus, and the tissues surrounding one ureter. She was treated by ileotransversostomy, followed in 2 weeks by right hemicolectomy and resection of the infiltrated organs and tissues. She died in cachexia 2 months later with metatastic proliferation.

9517 THREE HUNDRED CASE HISTORIES OF DIVERTICULITIS OF THE COLON, WITH PARTICULAR EMPHASIS ON SURGICAL TREATMENT. (Fr.) Verschraegen, J. (St. Pierre Univ. Hosp., Brussels, Belgium) and J. Ansay. *Acta Gastroenterol. Belg.* 34(8-9):608-618, 1971.

Among 300 patients hospitalized for diverticulitis, the overall male-female ratio was approximately 1:2, although it was 3:1 among 45 of 300 who were under 60-yr of age. In 294 of 300 cases, the sigmoid was affected, including 194 patients in whom the sigmoid alone was involved. Among patients who were seen for initial diagnosis, 17 of 270 also had cancers of the colon. Treatment was medical in 206 of 300, of whom 7 died while still hospitalized. Six of 300 presented with peritonitis and died before surgical intervention was possible. Surgery was performed in 88 of 300, of whom 37 (42%) were deceased at the time of report, including 67% of those undergoing emergency surgery but only 25% of those for whom the time of intervention could be chosen.

9518 ADENOCARCINOMA OF THE COLON AND RECTUM. (Fr.) Gerard, A. (St. Pierre Univ. Hosp., Brussels, Belgium), J. P. Dereume and J. C. Pector. *Acta Gastroenterol. Belg.* 34(8-9): 595-607, 1971.

Among 171 patients with histologically confirmed colorectal adenocarcinoma, primary tumor sites were as follows: rectum, 45%; sigmoid, 22%; ascending, transverse and descending colon, 11% (each). Two patients presented with multiple primaries. Radical surgery, with hope of a favorable outcome, was performed in 45.6%; palliative surgery, in 45.0%; 9.4% were inoperable. Successful ablation of the primary tumor was achieved in 62% (total). Following emergency surgery, the postoperative mortality rate was 32%; among patients with non-obstructing tumors, it was 6%. Five-yr survival rates were 28.6% for all patients, 53.7% among patients with hope of a favorable outcome at the time of intervention. After palliative surgery which included ablation of the primary, mean survival time was 17.8 months, with 5 of 28 patients still surviving after more than 5 yr, at the time of report. When such ablation was not possible, it was 7.6 months, with only 1 of 49 patients surviving 5 yr, prior to exacerbation and death.

9519 TUBE CECOSTOMY: AN EVALUATION OF 161 CASES. (E.) Clark, D. D. (Case Western Reserve U. Sch. Med., Cleveland, Ohio) and C. A. Hubay. *Ann. Surg.* 175(1):55-61, 1972.

In 10 yr at University Hospitals of Cleveland, tube cecostomy was employed 161 times in as many patients. In 97 patients with neoplastic and non-inflammatory disease in whom tube cecostomy was used as a prophylactic vent for distal anastomosis, anastomotic leak occurred only twice and there were only 5 deaths. When abscess or fistula is encountered at the time of resection or when dealing with inflammatory diseases of the colon (diverticulitis) tube cecostomy should be used with caution. Cecostomy was an effective means of decompression of acute obstruction when the obstruction was not associated with perforation, fecal impaction, or intestinal wall non-viability. Cecostomy could be used in treating cecal perforation and advanced appendicitis, but not in treating cecal volvulus where cecoplexy is preferable. Five of 6 patients with intestinal obstruction secondary to carcinomatosis derived little benefit from tube cecostomy. Major complications involving the cecostomy were wound infections, cecal fistula and i.p. leakage.

9520 THE DIFFERENTIAL DIAGNOSIS OF LARGE BOWEL STRICTURES. (E.) Simpkins, K. C. (Gen. Infirm., Leeds, England) and A. C. Young. *Clin. Radiol.* 22(4):449-457, 1971.

Barium enema demonstration of a localized constricting lesion of the large bowel (annular carcinoma, diverticular disease, extrinsic lesions including inflammatory masses or tumors) presents the radiologist with a common problem of differential diagnosis. In differentiating carcinoma from diverticular disease, the presence of abrupt narrowing with shouldering, and complete destruction of the mucosa indicates carcinoma. The radiographic changes of extrinsic lesions affecting the large intestine are of 2 types: displacement and compression of the bowel by a large mass without actual bowel involvement (ovarian cyst, uterine fibroid or distended bladder) or colonic involvement by extension from an extracolonic mass (e.g. peritoneal metastasis in the rectosigmoid). Extrinsic lesions and Crohn's disease may resemble ischemic colitis. Consideration of the clinical and pathological findings in conjunction with the radiological features is often necessary for accurate diagnosis. The site and length of a stricture, together with the appearance of its ends (blunted or tapering) and body are of importance in determining its nature.

9521 TWO UNUSUAL RADIOLOGICAL SIGNS OF CROHN'S DISEASE OF THE COLON. (E.) Berridge, F. R. (Addenbrooke's Hosp., Cambridge, England). *Clin. Radiol.* 22(4):443-448, 1971.

Two unusual signs seen in 4 examples each of 50 cases of Crohn's disease of the colon were: filling defects in the medial wall of the cecum which simulated carcinoma and localized scattering and narrowing of the colon with the formation of large false diverticula. The only distinguishing feature of filling defects in the cecum of Crohn's disease from those due to carcinoma is coincident disease of the terminal ileum or colon. In 2 patients, the filling defects showed finger tip indentations which are unusual in carcinoma. The false diverticula were symmetrically distributed around the colon in 1 case and asymmetrical in the others; the necks of the false diverticula were narrow. The condition was observed only when the disease was quiescent or of very low grade activity and the bowel appeared radiologically normal or slightly puckered. These false diverticula are more characteristic when they occur in the right side of the colon.

9522 PREOPERATIVE ORAL ANTIBIOTIC TREATMENT. HEALING OF COLONIC ANASTOMOSES IN THE CAT. (E.) Sternberg, A., I. Kott, I. Urca (Beilinson Hosp., Petah Tiqva, Israel) and M. Lurie. *Arch. Surg.* 103(6):735-740, 1971.

Colonic anastomoses were performed on 2 groups of 15 cats each: a control group and a group preoperatively prepared with orally administered kanamycin sulfate and chloramphenicol. The abdominal cavities of 5 cats were reopened on the fourth, sixth and eleventh postoperative days. Diarrhea and anastomotic leakage occurred rarely; however, wound infections were more numerous and serious in those animals who had received orally administered antibiotics. No complete sterility was achieved by the antibiotics preparation, since it facilitated the appearance of drug-resistant bacterial strains. The preparation did not facilitate emergence of staphylococci in the colon. There was a delay in the initial healing stage in the prepared cats, evident at 4 days postoperatively. This delay was overcome on the sixth and eleventh days. Less peritoneal adhesions were found in the antibiotic pretreated group. Preoperative oral administration of antibiotics as an effective preparative method for colon surgery cannot be recommended.

9523 ISCHEMIC COLITIS ASSOCIATED WITH CARCINOMA OF THE SIGMOID COLON. A CASE REPORT. (E.) Petigrow, N. (Mt. Sinai Hosp., Miami Beach, Fla.) and W. M. Ludwig. *Am. J. Gastroenterol.* 56(6):550-554, 1971.

A 69-yr-old male patient with carcinoma of the sigmoid colon displaying the clinical and roentgenographic findings characteristic of ischemic colitis is presented. The malignancy which showed vascular invasion was masked by the prominent features of colitis; surgical intervention was therefore delayed. A left hemicolectomy with end-to-end anastomosis was performed 4 months after the initial clinical presentation due to recurrent rectal bleeding, and the patient had an uneventful recovery. Follow-up examination over 6 months was unremarkable. The nonobstructing carcinoma in this patient may have resulted in mucosal ischemia secondary to the volvulus, or by causing subtle changes in colonic motility and intraluminal pressure.

9524 VARICES OF THE APPENDIX AND CECUM. (E.) Mikat, D. M. (Pontiac Gen. Hosp., Mich.). *Am. J. Surg.* 122(6):832-833, 1971.

A 47-yr-old male with periappendiceal and cecal varicosities is presented. Almost the entire appendix was surrounded by large dilated vascular channels and the adjacent cecum was similarly encircled by less prominent varicosities. Examination of the rest of the colon and small intestine revealed no other lesions and no changes were apparent in the larger blood vessels or viscera. No process was discovered that could account for the lesion such as venous thrombosis, extrinsic pressure as by tumor, adhesions, vascular kinking or twisting, passive congestion or portal hypertension. A congenital anomaly of the intramural colonic veins may be responsible for the observed abnormality.

9525 TRANSVERSE COLOSTOMY. (E.) Hurwitz, A. (Mt. Sinai Hosp., Miami Beach, Fla.). *Am. J. Surg.* 122(6):834, 1971.

A safe and efficacious method of performing a transverse colostomy which allows the surgeon to decompress the dilated bowel and to divert the fecal stream at the time of operation is described. An opening is made in the mesocolon through which a glass rod is passed at the conclusion of the procedure. A purse-string suture of 2-0 chromic catgut is placed in the proximal side of the transverse colon and the bowel opened after exteriorization and proper walling-off. After aspiration of the luminal contents a number-22 catheter is placed through the same opening and passed in a proximal direction for 5-6 inches, and anchored by tying the purse-string suture and impaling its wall with the same needle. The glass rod is passed through the opening in the mesocolon along with a Zachary Cope-DeMartel clip. The blades of the clip are then brought together to occlude the transverse colostomy just distal to the catheter.

9526 HIRSCHSPRUNG'S DISEASE. (E.) Ehrenpreis, T. (Karolinska Hosp., Stockholm). *Am. J. Dig. Dis.* 16(11):1032-1052, 1971.

A survey of present-day concepts of Hirschsprung's disease and related disorders is presented. The incidence of Hirschsprung's disease is around 1:5000 live births, the overall incidence among siblings of index patients being 3.6% as compared to 0.02% of the general population with a greater rise in siblings of male index patients. There is little evidence of simple Mendelian inheritance, but sensitivity of ganglion cells to anoxemia may play an important etiologic role. The pathologic physiology and the clinical applications of this information are discussed. Enterocolitis occurs as a serious complication of Hirschsprung's disease in 20-30% of the patients, with mortality rates of 30-50%. A history of constipation starting as a neonatal intestinal obstruction, and clinical findings of a distended abdomen and an empty rectum are highly suggestive of a diagnosis of Hirschsprung's disease, but the demonstration of a distal narrow segment by barium enema and rectal biopsy confirmation of aganglionosis are the main basis for confirming the diagnosis. The main objective of treatment is to relieve obstruction, temporarily in emergencies, and later on permanently, by definitive surgery. The use of various surgical procedures and the physiological and clinical achievements of these procedures are presented.

9527 PREVENTION OF URINARY RETENTION AFTER ANORECTAL OPERATIONS. (E.) Campbell, E. D. (Southeast Missouri Hosp., Cape Girardeau, Mo.). *Dis. Colon Rectum* 15(1):69-70, 1972.

A simple method which eliminates bladder distention and the need for catheterization after anorectal operations is presented, and 100 consecutive anorectal procedures successfully completed without the need for catheterization are reported. The technique consists of dehydration of the patient, starting the night before surgery until the morning of the first postoperative day, sedation and ambulation on the morning of the first postoperative day. An important part of the method is being positive with the patient that urination will occur spontaneously and without difficulty, and instructing the patient and nursing staff on achievement of this goal. In 100 consecutive adult patients of all ages, urination occurred within 36 hr after surgical procedures for hemorrhoids with or without fissure or fistula or hemorrhoids with other disease.

9528 SURGICAL TREATMENT OF TUMORS OF THE CECUM. (Ger.) Wanzjan, E. N. (M. B. Res. Inst. Clin. Exp. Surg., Moscow) and T. I. Nowgorodskaja. *Langenbecks Arch. Chir.* 328(4): 364-370, 1971.

Among 142 patients with tumors of the cecum treated between 1951 and 1971 there were 15 benign tumors (8 polyposis, 3 fibromas, 2 lipomas, 1 fibrolipoma, 1 leiomyoma) of which 7 were treated by hemicolectomy, 8 by tumor removal. There were also 26 cases of inflammatory lesions (5 tuberculosis, 3 actinomycosis, 2 Crohn's disease, 1 syphiloma, 1 lymphogranulomatosis, 14 nonspecific inflammation tumors) of which 22 were treated by hemicolectomy, and 101 carcinomas of the cecum. The majority of carcinomas were in an advanced stage of development (57 in stage III, 26 in stage IV). In 29 of 101 the tumor was inoperable, but in 72 of 101 radical hemicolectomy was performed. Among cancer patients, deaths occurred shortly after surgery in 12 of 72 (10 from peritonitis, 2 cardiovascular insufficiency, embolism) after radical, and in 8 of 21 (3 and 5, resp.) after palliative hemicolectomy. Surgical procedure, consisting of ligature of the colon proximally and distally to the tumor, preliminary ligation of the arteries and, after hemicolectomy, antiperistaltic side-to-side ileotransversostomy for the restoration of the continuity of the intestine, is described in detail, and difficulties of early diagnosis of cecum carcinoma stressed.

9529 CLINICAL EVALUATION OF ELECTROCOAGULATION IN THE TREATMENT OF CANCER OF THE RECTUM. (E.) Madden, J. L. (St. Clare's Hosp., New York, N. Y.) and S. Kandalaft. *Am. J. Surg.* 122(3):347-352, 1971.

9530 ACUTE APPENDICITIS WITH PERFORATION. (E.) Holgersen, L. O. (St. Luke's Hosp. Ctr., New York, N. Y.) and E. G. Stanley Brown. *Am. J. Dis. Child.* 122(4):288-293, 1971.

9531 ARTIFICIAL ANUS. (Ger.) Anke, H. (Ernst Moritz Arndt U., Surg. Clin., Greifswald, Germany), R. Braune and G. Maskow. *Dtsch. Gesundheitsw.* 26(35):1650-1654, 1971.

9532 CANCER OF THE LEFT COLON. (Fr.) Baulieux, J., P. Vuillard, J. Venouil and L. Fischer. *Cah. Med. Lyon.* 47(29):3099-3111, 1971.

9533 A RARE FORM OF ANAL FISTULA CARCINOMA. (Ger.) Werner, G. (Erfurt Med. Acad., Germany), M. Schroter and W. Schmidt. *Zentralbl. Chir.* 96(32):1110-1111, 1971.

9534 CANCER OF THE ANUS. (Fr.) Chevrel, B. (St. Antoine Hosp., Paris) and J. P. Chevrel. *Presse Med.* 79(5):211-214, 1971.

9535 POLYPOID AND ULCERATIVE LESIONS OF COLON AND SMALL INTESTINE. CASE REPORT. (It.) Mellins, H. Z. and J. B. Blennerhasset. *Policlinico* [*Prat.*] 78(12):487-501, 1971.

9536 SOAP COLITIS. (E.) Pike, B. F. (USAF Med. Ctr., Kessler AFB, Miss.), P. J. Philippi and E. H. Lawson, Jr. *N. Engl. J. Med.* 285(4):217-218, 1971.

9537 PROGRESSIVE OBSTRUCTION OF LOWER INTESTINE. (E.) Bruno, M. S. (Beekman Downtown Hosp., New York, N. Y.) and W. B. Ober. *NY State J. Med.* 71(17):2075-2081, 1971.

9538 DUPLICATION OF THE CECUM (COMPLICATED INTRALUMINAL VARIETY). (Sp.) Carpanelli, J. B. and F. S. Martinod. *Bol. Soc. Argent. Cir.* 32(4):151-158, 1971.

9539 VOLVULUS OF THE CAECUM AND ASCENDING COLON WITH NON-ROTATION OF THE MID GUT. (REPORT OF TWO CASES). (E.) Thirunavukkarasu, T. K. (Govt. Headquarters Hosp., Tiruchirapalli, India). *Antiseptic* 68(7):525-528, 1971.

9540 ELECTROCOAGULATION IN THE TREATMENT OF CANCER OF THE RECTUM. A CONTINUING STUDY. (E.) Madden, J. L. (St. Clare's Hosp., New York, N. Y.) and S. Kandalaft. *Ann. Surg.* 174(3):530-540, 1971.

9541 COMPLETE PROLAPSE OF THE RECTUM. A REPORT ON 140 CASES TREATED BY RECTOPEXY. (E.) Loygue, J. (St. Antoine Hosp., Paris), M. Huguier, M. Malafosse and H. Biotois. *Br. J. Surg.* 58(11):847-848, 1971.

9542 MALIGNANT CARCINOID OF APPENDIX. (E.) Pearlman, D. M. (Albert Einstein Coll. Med., New York, N. Y.) and K. Srinivasan. *NY State J. Med.* 71(12):1529-1531, 1971.

9543 IRRIGATION VERSUS NONIRRIGATION OF COLOSTOMY. (E.) Wee, G. C. (Jefferson Barracks VA Hosp., St. Louis, Mo.), L. D. Jack and W. Shieber. *Mo. Med.* 68(8):622-625, 1971.

9544 A CASE OF BURSTING OF THE SIGMOID COLON DUE TO THE INJECTION OF COMPRESSED AIR INTO THE ANUS. (It.) Scarabelli, L. (Univ. Inst. Gen. Clin. Surg., Pavia, Italy) and L. Bonandrini. *Minerva Chir.* 26(12):639-645, 1971.

9545 PASTEURELLA PSEUDOTUBERCULOSIS INFECTION COMPLICATING ACUTE APPENDICITIS. (E.) Zentner, G. (Roy. Child. Hosp., Melbourne, Austrlia). *Med. J. Aust.* 2(4):205-206, 1971.

9546 CROHN'S DISEASE OF THE COLON (DIFFUSE FORM) AND RECTUM. CLINICAL FEATURES AND COURSE OF 3 CASES. (Sp.) Berenguer, J. (La Fe City Sanit., Valencia, Spain), G. Garrido and M. Rodrigo. *Med. Esp.* 65(386):342-354, 1971.

9547 DISCOVERY OF A RECTOSIGMOIDAL VILLOUS TUMOR AS A RESULT OF SEVERE WATER AND ELECTROLYTE DEPLETION IN A PATIENT PREVIOUSLY GASTRECTOMIZED FOR CANCER. (Fr.) Lefebvre, J., M. Verhaeghe, A. Clay and C. Chechan. *Lille Med.* 16(6):846-851, 1971.

9548 INFLAMMATORY TUMORS OF THE TRANSVERSE COLON. (Rus.) Kravets, S. T. *Klin. Khir.* 51(7):65-66, 1971.

9549 THE INTERNAL OPENING OF ANORECTAL FISTULAS. (Rus.) Tuid'anov, H. K. *Klin. Khir.* 51(7):66-68, 1971.

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9553 VOLVULUS OF THE CECUM AND ASCENDING COLON. (E.) Figiel, S. J. and L. S. Figiel. *J. Abdom. Surg.* 13(7):156-158, 1971.

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9560 SERIOUS WATER AND ELECTROLYTE LOSSES ASSOCIATED WITH VILLOUS TUMORS OF THE RECTUM. (Fr.) Cavellat, J. F., A. Tadei and Y. Nouchet. *Anesthesiol. Analg. Reanim.* 28(3): 507-519, 1971.

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9565 DUPLICATION OF THE TRANSVERSE COLON, INCLUDING A CONTRIBUTION TO THE THEORY

CONCERNING THE DEVELOPMENT OF THIS MALFORMATION. (Ger.) Reismann, B. (Univ. 2nd Surg. Clin., Cologne, Germany), H. J. Hernandez Richter and G. Lill. *Z. Kinderchir.* 10(2):184-192, 1971.

9566 PATHOGENESIS AND THERAPY OF EXTENSIVE POLYCYSTIC LYMPHANGIOMA OF THE COLON. (Ger.) Strauss, W. (Olga Hosp., Stuttgart, Germany). *Z. Kinderchir.* 10(2):249-255, 1971.

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9568 DETECTION OF TUMOR CELLS IN BLOOD OF PATIENTS WITH MALIGNANT TUMORS OF THE RECTUM. (Rus.) Iakovleva, M. P. (N. N. Petrov Res. Inst. Oncol., Leningrad, USSR), R. N. Poljukhova and I. K. Seleznev. *Vopr. Onkol.* 17(6):39-44, 1971.

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9574 ILEORECTAL ANASTOMOSIS: REVIEW 1952 TO 1968. (E.) Aylett, S. O. (Gordon Hosp., London). *Proc. R. Soc. Med.* 64(9):967-971, 1971.

9575 A RARE CASE OF MECHANICAL OCCLUSION OF THE INTESTINE DUE TO A PESSARY. (Pol.) Lukomski, L. (Dist. Hosp., Sanok, Poland). *Pol. Tyg. Lek.* 26(31):1202-1203, 1971.

9576 EXPERIENCES WITH DOUBLE CONTRAST RADIOGRAPHY OF THE LARGE INTESTINE. (Ger.) Hof, J. (Ganghoferstr. 154, Munich, Germany) and H. May. *Munch. Med. Wochenschr.* 113(42):1378-1384, 1971.

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9578 THE MOTOR ACTIVITY OF THE GASTROINTESTINAL TRACT IN PATIENTS WITH APPENDICITIS. (Rus.) Grinevich, V. A. *Khirurgiia (Mosk.)* 47(9):55-58, 1971.

9579 FAECAL STEROID COMPOSITION AND ITS RELATIONSHIP TO CANCER OF THE LARGE BOWEL. (E.) Hill, M. J. (St. Mary's Hosp. Med. Sch., London) and V. C. Aries. *J. Pathol.* 104(2):129-139, 1971.

9580 CLINICAL, HISTOLOGIC AND IMMUNOLOGIC ASPECTS OF POST-DYSENTERIC COLITIS. (Rus.) Makarevich, I. A. and I. I. Pinkhasov. *Sov. Med.* 34(5):24-32, 1971.

9581 THE GEOGRAPHICAL PATHOLOGY OF BOWEL CANCER AND SOME RELATED DISEASES. (E.) Hutt, M. S. R. (St. Thomas Hosp. Med. Sch., London) and A. C. Templeton. *Proc. R. Soc. Med.* 64(9):962-964, 1971.

See also numbers: 9047, 9184, 9198, 9322, 9447

9582 CONTROLLED TRIAL OF AZATHIOPRINE IN CROHN'S DISEASE. (E.) Rhodes, J. (Univ. Hosp., Cardiff, Wales), P. Beck, D. Bainton and H. Campbell. *Lancet* 2(7737):1273-1276, 1971.

Azathioprine was evaluated in 16 patients with active Crohn's disease in a double-blind, crossover trial. During the azathioprine period, 7 of 15 patients had no change in symptoms, 6 deteriorated and 2 improved. During placebo period, no change was seen in 11 patients, one deteriorated, and 2 (possibly 3) improved. Of the 6 patients who became worse while on azathioprine, the drug was the cause of problems (allergic reaction and severe colic) in 2. Although the WBC count fell in most patients while on azathioprine, only 1 developed a leukopenia of less than 3000 per mm. There was no difference in the occurrence of colic or stool frequency in the 2 treatment periods. Certain forms of Crohn's disease, in a particular phase of activity, may be responsive to azathioprine; however, it should be used with caution and only when other measures have failed.

9583 CONTROLLED TRIAL OF AZATHIOPRINE IN CROHN'S DISEASE. (E.) Willoughby, J. M. T. (St. Bartholomew's Hosp., London), J. Beckett, P. J. Kumar and A. M. Dawson. *Lancet* 2(7731):944-947, 1971.

Subjects with Crohn's disease (22) consisted of 12 in a moderate-to-severe first attack or relapse who had not received corticosteroid treatment in the previous 3 months and 10 outpatients on long-term prednisolone treatment (5-72 months), requiring 7.5-15.0 mg/day to control symptoms. Half the patients in each group received azathioprine, the other half placebo. In the first group, prednisolone was started at 60 mg/day and, once a remission was obtained, was reduced on a 3-week schedule to 10 mg; if improvement continued after discharge, prednisolone was discontinued. Azathioprine was given at 4 mg/kg/day for the first 10 days, then 2 mg/kg/day for 14 days. Patients in the second group received azathioprine at 2 mg/kg/day together with their current dosage of prednisolone for at least 4 weeks after prednisolone was reduced as for the first group. Azathioprine was more effective than placebo in maintaining a remission induced by prednisolone with or without azathioprine. Ten of 11 patients receiving azathioprine completed the 24-week trial, while 8 of 11 taking placebo relapsed and had to be withdrawn. Laboratory results of patients on placebo bore little relation to their clinical response, while improvement due to azathioprine was usually adequately reflected in laboratory tests. The mean interval between discontinuation of prednisolone and completion of or withdrawal from the trial was 10.7 weeks for those on azathioprine and 4.0 weeks for those on placebo.

9584 EOSINOPHILIC GRANULOCYTES IN THE RECTAL MUCUS OF PATIENTS WITH ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE ILEUM AND COLON. (E.) Anthonisen, P. (Gentofte Hosp., Hellerup, Denmark) and P. Riis. *Scand. J. Gastroenterol.* 6(8):731-734, 1971.

Cytologic imprints of the rectal mucus were taken from 359 patients with ulcerative colitis and 36 patients with Crohn's disease of the small and large bowel at first diagnostic contact and examined for inflammatory cells. Approximately 70% of the ulcerative colitis patients (248) disclosed eosinophilia. On the other hand, in Crohn's disease eosinophilia was an exception, only 15% (4) of the patients showing these inflammatory cells in their rectal mucus. The difference between the proportions is highly significant. In Crohn's disease neutrophils were the predominant cells in the rectal mucus. Thus, the presence of eosinophils in the rectal mucus of patients not being treated with glucocorticoids makes a diagnosis of ulcerative colitis more likely than one of Crohn's disease.

9585 ULCERATIVE DISEASE OF THE LARGE INTESTINE IN PATIENTS MORE THAN 50 YEARS OLD. (E.) Earle, E. (Houston, Tex.) and R. J. Rowe. *Dis. Colon Rectum* 15(1):33-40, 1972.

The incidence, diagnosis, indications for surgery, and the surgical management of 18 patients over 50 yr of age, selected from a larger series of 105 patients, with nonspecific ulcerative disease of the large intestine are presented. There were 9 cases of granulomatous colitis and 9 cases of nonspecific ulcerative colitis. Most of the 18 patients had more than one indication for surgery. These indications were medical intractibility in 13, anemia in 11, anorectal disease in 4, toxic megacolon in 2, suspected carcinoma in 4, massive hemorrhage in 3, and perforation with abscess and peritonitis in 1. The surgical procedures performed on the patients were colectomy and ileostomy in 7, proctocolectomy and ileostomy in 4, colectomy and ileoproctostomy in 2, right colectomy and ileotransversostomy in 1 and various other procedures in the other 4. Excellent surgical results were obtained in 7 patients, good results in 6, and poor results, including 3 deaths, in 5. The overall surgical mortality was 5.5%. The patients treated by limited resection and/or diverting colostomy all eventually died. Total colectomy and ileostomy appeared to be the best surgical procedure for most of the patients.

9586 ISCHEMIC ORIGIN OF ULCERATIVE COLITIS ASSOCIATED WITH POTENTIALLY OBSTRUCTING LESIONS OF THE COLON. (E.) Schwartz, S. S. (Yale-New Haven Hosp., Conn.) and S. J. Boley. *Radiology* 102(2):249-252, 1972.

Of 90 patients with ischemic disease of the colon, 9 also had associated neoplasms. These patients commonly presented with a picture of decreased blood flow rather than carcinoma, and this was seen as intramural hemorrhage (a characteristic of ischemic necrosis) with rapid resolution to ulcerative colitis, stenosis or frank gangrene. In experimental animals, increases in intraluminal pressure were accompanied by decreases in mesenteric arterial blood flow, and this was reversible with release of the increased pressure. With repetition of such insults, the ischemia was prolonged beyond the period of elevated pressure. Using in vivo intra-arterial injection of silicone rubber at normal and elevated intraluminal pressures there was marked redistribution of blood flow; at normal pressures, the mucosal and muscular branches were filled preferentially while, at elevated pressures, the submucosal and serosal branches were filled. The mucosal layer was least tolerant to anoxemia, commonly showing reversible intramural hemorrhage or ulceration.

9587 TWO CASES OF HEMORRHAGIC ULCERATIVE COLITIS. (It.) Giardiello, A. (F. Palasciano Civil Hosp., Caserta, Italy), D. Russo and S. Scarpelli. *Rass. Int. Clin. Ter.* 51(10): 632-642, 1971.

9588 ULCERATIVE PROCTOCOLITIS (REPORT OF CASES). (It.) De Longis, G. (U. Naples Inst. Gen. Clin. Surg., Italy), A. Cennamo and G. Scaramellino. *Rass. Int. Clin. Ter.* 51(10):621-631, 1971.

9589 THE IMPORTANCE OF DISTINGUISHING BETWEEN GRANULOMATOUS COLITIS AND ULCERATIVE COLITIS. (It.) Biancalana, L. (U. Turin Sch. Med., Italy). *Rass. Clin. Sci. Inst. Biochim. Ital.* 47(5):180-182, 1971.

9590 NONSPECIFIC ULCERATIVE COLITIS ASSOCIATED WITH LUPUS ERYTHEMATOSUS. REPORT OF ONE CASE. (Fr.) Vilela, M. P. (Paulista Med. Sch., Sao Paulo, Brazil), D. R. Borges and J. C. Carvalho. *Presse Med.* 79(23):1060-1061, 1971.

9591 CYTOMEGALIC INCLUSION DISEASE AND ULCERATIVE COLITIS. PRESENTATION OF A CASE. (Sp.) Rodriguez Mendez, F. (Red Cross Hosp., Barcelona, Spain) and M. Galofre. *Med. Clin. (Barc.)* 56(6):809-812, 1971.

9592 THE LIVER IN ULCERATIVE COLITIS PATIENTS. (E.) Royer, M. *Acta Gastroenterol. Lat. Am.* 2(2):97-98, 1970.

9593 DIFFERENTIAL DIAGNOSIS OF JAUNDICE IN PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Karnaukhov, V. K. and E. V. Stantso. *Ter. Arkh.* 43(6):25-29, 1971.

9594 PATHOLOGY OF ULCERATIVE COLITIS. (E.) Morson, B. C. (St. Mark's Hosp., London). *Proc. R. Soc. Med.* 64(9):976-977, 1971.

9595 SURGICAL TREATMENT OF ULCERATIVE COLITIS. (E.) Goligher, J. C. (Gen. Infirm., Leeds, England). *Proc. R. Soc. Med.* 64(9):973-976, 1971.

9596 MEDICAL MANAGEMENT OF ULCERATIVE COLITIS. (E.) Paulley, J. W. (Ipswich East Suffolk Hosp., England). *Proc. R. Soc. Med.* 64(9):971-973, 1971.

9597 EMERGENCY OPERATIONS IN NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Iudin, I. I. and V. V. Sergevnin. *Khirurgiia (Mosk.)* 47(9):80-87, 1971.

9598 ULCERATIVE COLITIS DUE TO AMEBAE. (Sp.) Santillan Villasenor, M. and J. Vargas De La Cruz. *Cir. Cir.* 39(2):849-853, 1971.

See also number: 9472

9599 THE SIGNIFICANCE OF THE VENOUS PHASE OF CELIAC AND SUPERIOR MESENTERIC ARTERIOGRAPHY IN EVALUATING PANCREATIC CARCINOMA. (E.) Buranasiri, S. (Graduate Hosp., Philadelphia, Pa.) and S. Baum. *Radiology* 102(1):11-20, 1972.

The angiograms of 50 unselected, consecutive cases of carcinoma of the pancreas are reviewed. Of 47 cases with adequate visualization of the splenic, portal and superior mesenteric veins, 46 had definite venous involvement ranging from mild compression to complete occlusion with filling of numerous collaterals. Whereas the superior mesenteric vein or portal vein was usually affected when the tumor involved the pancreatic head, tumors of the body and tail of the pancreas deformed or occluded the splenic vein. When the tumor extensively involved the pancreas, occlusion of multiple veins including the splenic, superior mesenteric, and portal were often observed. Collateral venous drainage via the stomach, colon, or retroperitoneal area was frequent in these patients.

9600 RELATING MUCUS, CALCIUM, AND SWEAT IN A NEW CONCEPT OF CYSTIC FIBROSIS. (E.) Gibson, L. E. (Child Mem. Hosp., Chicago, Ill.), W. J. Matthews, Jr., P. T. Minihan and J. A. Patti. *Pediatrics* 48(5):695-710, 1971.

The authors describe the results of 6 experiments demonstrating a relationship between mucus permeability, calcium and sweat. When flow rates of saline through a film of nondialyzable mucus residue from submaxillary saliva were measured, flow from films made from normal saliva was significantly increased by the addition of calcium, and the flow through a residue of saliva made from patients with cystic fibrosis was also significantly greater than through normal saliva. In measurement of flow of fluids across the rat intestinal wall, the removal of mucus with bicarbonate solutions and the incubation of the intestine with calcium solutions led to an increased rate of flow. Incubation of the rat intestine with cystic fibrosis and normal sera resulted in greater rates of flow into the lumen treated with cystic fibrosis serum than into the lumen treated with normal serum. In normal subjects, iontophoresis of calcium prior to pilocarpine iontophoresis resulted in sweat with a greater concentration of chloride and a lower rate of production than those obtained with pilocarpine iontophoresis alone. It is concluded that mucus inhibits the passive flow of water and small ions. Cystic fibrosis is a condition in which the mucus is hyperpermeable and fails to function adequately secondary to an excess secretion of calcium from exocrine glands.

9601 ENZYMATIC STUDY IN THE SERUM AND URINE OF PANCREATECTOMIZED ANIMALS. (Sp.) Munoz Calvo, R. (Spanish Inst. Physiol. Biochem., Madrid), T. Unzaga Marco and J. Lucas Gallego. *Rev. Esp. Fisiol.* 27(2):149-154, 1971.

9602 PROBLEMS OF PANCREATIC ARTERIOGRAPHY. (Ger.) Porstmann, W. (Humboldt U., Berlin), W. Münster, D. Lucas and P. A. Romaniuk. *Radiol. Diagn. (Berl.)* 12(2):196-212, 1971.

9603 ULTRASTRUCTURE OF THE PANCREAS DURING EXPERIMENTAL CORONARY CAROTID PERFUSION. (Rus.) Barhina, T. G. and L. A. Sumbatov. *Arkh. Anat. Gistol. Embriol.* 60(7):16-21, 1971.

9604 HEMOLYTIC ANEMIA AND PANCREATIC ACINAR ATROPHY AND FIBROSIS CONDITIONED BY 'ELEMENTAL' LIQUID DIETS AND THE ORDINARY INTESTINAL MICROFLORA. (E.) Levenson, S. M. (Albert Einstein Coll. Med., Bronx, N. Y.), D. Kan and C. Gruber. *Ann. Surg.* 174(3):469-510, 1971.

9605 ULTRASONIC DIAGNOSIS OF TUMORS OF THE PANCREATIC REGION. (Ger.) Engelhart, G. J. and U. W. Blauenstein. *Med. Hyg.* 29(948): 118-120, 1971.

9606 INDICATIONS AND RESULTS OF SURGERY IN 155 CASES OF CANCER OF PANCREAS. (Fr.) Salembier, M. Y. *Lille Chir.* 26(2):57-65, 1971.

9607 ANGIOGRAPHY IN PANCREATIC DISEASES. (E.) Pinchuk, L. A. (Julio Mendez Hosp., Buenos Aires, Argentina). *Acta Gastroenterol. Lat. Am.* 2(2):87-95, 1970.

9608 PANCREATIC ASCITES AND THORACIC FLUID COLLECTIONS IN PANCREATIC PSEUDOCYSTS. PERSONAL EXPERIENCES WITH SIX CASES. (Slovene) Zakelj, V. (MF Surg. Clin., Ljubljana, Yugoslavia). *Zdrav. Vestn.* 40(5):187-190, 1971.

9609 A CASE OF CARCINOMA OF THE PANCREAS DIAGNOSED BY HYPOTONIC DUODENOGRAPHY. (Jap.) Nakatani, M. (Saiseikai Wakayama Hosp., Wakayama, Japan), M. Shingaki and S. Sionuma. *Wakayama Igaku (J. Wakayana Med. Soc.)* 22(1): 95-98, 1971.

9610 THE ROLE OF SCINTIGRAPHY IN THE DIAGNOSIS OF DISEASES OF THE PANCREAS. (Rus.) Zsebok, Z., F. Hernadi and K. Martonffi. *Vestn. Rentgenol. Radiol.* 46(4):48-51, 1971.

9611 PANCREATODUODENAL RESECTION IN RARE FORMS OF PANCREATIC HEAD TUMOURS.

(Rus.) Ermolov, A. S., E. A. Muginshtein and P. I. Ostrin. *Sov. Med.* 34(5):91-94, 1971.

9612 JAUNDICE FROM PANCREATIC PSEUDOCYST. (E.) Masih, B. (Grasslands Hosp., New York, N. Y.), A. B. Lowenfels, P. D. Pendse and M. Rohman. *NY State J. Med.* 71(19):2312-2313, 1971.

9613 ANGIOGRAPHY IN DISEASES OF THE PANCREAS. (Ger.) Pokieser, H. (Univ. Ist Med. Clin., Vienna). *Roentgenblatter* 24(6):281-288, 1971.

See also numbers: 9002, 9202, 9213, 9356, 9502, 9633

PANCREATITIS

9614 RECURRENT PANCREATITIS DUE TO PARATHYROID ADENOMA IN A NORMOCALCEMIC PATIENT. (E.) Ballon, S. (1950 Cooley Ave., Palo Alto, Calif.), H. Cohen and Z. Strasberg. *Can. Med. Assoc. J.* 106(1):51-54, 1972.

Physical examination, skeletal survey and serum electrolytes were all normal in a 53-yr-old Italian woman presenting with a left breast mass and mild diabetes. One month later, the patient complained of severe epigastric pain radiating to the left shoulder, sweating, diarrhea and nausea; she had a polymorphonuclear leukocytosis and elevated amylase and was treated successfully with i.v. fluids and nasogastric suction for acute pancreatitis. Three weeks later, the patient returned with nausea, heartburn and band-like upper abdominal pain; serum amylase fell from 1800 to 128 units after 2 days of conservative therapy. During a third pancreatitis episode 5 mo later, 6 serum calcium and phosphorus determinations were normal. Tubular resorption of phosphate was 79%. On the basis of this equivocal result (85% lower limit of normal), an angiographic search for a parathyroid tumor was undertaken. Surgical exploration of the neck revealed a left upper parathyroid adenoma measuring 3x2x1.5 cm lying completely inside a normal thyroid. Hyperparathyroidism was apparently the primary disturbance in this case.

9615 EXTRAHEPATIC PORTAL HYPERTENSION CAUSED BY CHRONIC PANCREATITIS. (E.) Longstreth, G. F. (Mayo Clin., Rochester, Minn.), A. D. Newcomer and P. A. Green. *Am. J. Intern. Med.* 75(6):903-908, 1971.

Pancreatitis was the sole predisposing disease in only 5 of 164 patients with extrahepatic portal hypertension. Four patients suffered gastrointestinal bleeding sometimes during their illness; splenomegaly was present on abdominal examination in 4 and at operation in the fifth patient. The correct diagnosis of extrahepatic portal hypertension was made before operation in only 2 cases. Splenoportography plays an important role along with upper gastrointestinal roentgenograms and endoscopy. Treatment of extrahepatic portal obstruction in pancreatitis depends on 2 factors: presence or absence of hemorrhage from esophageal varices and the location of the obstruction. For bleeding and splenic vein obstruction, treatment is splenectomy without a portal systemic shunt; if the portal vein is also obstructed, splenectomy alone is inadequate and a mesocaval shunt may be considered. With widespread occlusion, ligation of varices or resection of the esophagogastric junction may be the only choice.

9616 DEFIBRINATION IN ACUTE PANCREATITIS. (E.) Greipp, P. R. (NCI, Bethesda, Md.), J. A. Brown and H. R. Gralnick. *Ann. Intern. Med.* 76(1):73-76, 1972.

A case is reported of an 8-yr-old girl with a 7-yr history of acute lymphocytic leukemia who was admitted with a WBC of 16,500/mm^3 (with 67% segmented polyps and 3% blasts) and a moderately hypercellular marrow with 70% lymphoblasts, and a normal coagulation profile. She was started on i.v. L-asparaginase (20,000 units/day) and during the following week showed a decrease in temperature, WBC, peripheral lymphoblasts and size of liver and lymph nodes; the serum transaminases returned to normal from their mild elevation and the serum amylase remained mildly elevated. On the fifth day, the partial thromboplastin time and thrombin time were prolonged, the prothrombin time normal. This drug was discontinued on the ninth day when she developed focal motor seizures that were controlled with i.v. diazepam. Over the next few days she developed a classical case of acute pancreatitis with all the clinical and laboratory changes. All coagulation studies were markedly abnormal with moderate depression of factors VII and IX. High levels of proteolytic activity were present and increased levels of fibrin split products were noted. The plasminogen level was decreased and the euglobulin lysis time shortened, and the platelet count dropped. After 3 days she began to show improvement of all clinical and laboratory parameters. She was afebrile and asymptomatic when discharged. On the eleventh day after the onset of pancreatitis, a bone marrow specimen showed 100% leukemic cells.

9617 EPSILON-AMINOCAPROIC ACID IN TREATMENT OF ACUTE PANCREATITIS. (E.) Konttinen, Y. P. (Maria Hosp., Helsinki). *Scand. J. Gastroenterol.* 6(8):715-718, 1971.

The use of epsilon-aminocaproic acid (EACA) in the treatment of acute pancreatitis was evaluated in 47 patients and compared with results using Trasylol (41 patients) and conventional methods (41 patients). The differences in the rates of normalization of the laboratory values and duration of the hospotal treatment in the 3 groups were clinically insignificant. Whereas there were no deaths in the aminocaproic acid-treated group, there were 2 deaths in the Trasylol-treated group and 3 in the conventionally-treated group. In the Trasylol group 1 patient who died showed massive pulmonary embolism and pancreatic necrosis, and the other had pancreatic necrosis and acute renal tubular damage. The 3 conventionally treated patients that died showed acute hemorrhagic pancreatitis, with no significant renal changes. Thus, the use of epsilon-aminocaproic acid in acute pancreatitis does not appear to be attended with an undue risk of intravascular clotting.

9618 THE EFFECT OF SECRETIN AND PANCREOZYMIN ON PANCREATICO-DUODENAL LYMPH FLOW AND LIPASE ACTIVITY IN NORMAL DOGS AND ON THORACIC DUCT LYMPH FLOW AND LIPASE ACTIVITY IN RATS WITH CHRONIC PANCREATITIS. (E.) Papp, M. (Hungarian Acad. Sci. Inst. Exp. Med., Budapest), S. Ormai, E. J. Horváth and I. Fodor. *Lymphology* 4(3): 67-73, 1971.

Secretin and pancreozymin, when infused together in a dose of 0.1 U/kg body wt/min over a 45-min period into the pancreaticoduodenal artery significantly increased the rate of pancreatico-duodenal lymph flow from the pancreas of dogs pretreated with physiological saline. Secretin and pancreozymin failed to produce a greater effect on pancreaticoduodenal lymph flow than either physiological saline or secretin given alone. Lipase activity in pancreaticoduodenal lymph and in superior pancreaticoduodenal venous blood flow was increased only when secretin and pancreozymin were given simultaneously. Sunflower oil, as well as trypsin, when injected into the pancreas of rats, gave rise within 14-18 days to histological alterations characteristic of chronic pancreatitis. Lipase activity in the pancreatic juice following stimulation with secretin and pancreozymin was 1000 times higher in the normal controls than in the rats treated with sunflower oil, and 10 times higher than in the trypsin-treated animals. While thoracic duct flow was not affected by the injection of sunflower oil or trypsin into the pancreas, lipase activity was undetectably low in the blood plasma of these animals after secretin and pancreozymin stimulation.

9619 CHRONIC RELAPSING PANCREATITIS. SURGICAL MANAGEMENT INCLUDING SIXTY-THREE CASES OF PANCREATICODUODENECTOMY. (E.) Guillemin, G. (Hotel Dieu, Lyon, France), J. Cuilleret, A. Michel, P. Berard and J. Feroldi. *Am. J. Surg.* 122(6):802-807, 1971.

Pancreaticoduodenectomy was performed in 63 patients with chronic relapsing pancreatitis and stone formation after careful pre- and intraoperative evaluation. Of the 63 patients, 6 were lost to follow-up, 15 were dead and 42 alive at the end of 3 yr. Symptomatic and clinical results in the surviving 42 patients who were followed were good in 31 patients, fair in 6, poor in 2, and bad in 3. Pulmonary problems caused death in 6 patients, and hepatic cirrhosis was the cause of death in 8. Over the long term, the initially good results with respect to relief of pain was gradually vitiated in about a third of the patients. The good initial results were generally maintained in the patients who took a normal diet and abstained from alcohol. Thus, pancreaticoduodenostomy seems justifiable in patients with a strong and sincere desire to get well and have undergone other unsuccessful operative or medical procedures for chronic relapsing pancreatitis with pancreatic lithiasis.

9620 METHEMALBUMIN IN ACUTE PANCREATITIS: AN EXPERIMENTAL AND CLINICAL APPRAISAL. (E.) Kelley, T. R. (Case Western Reserve U. Sch. Med., Cleveland, Ohio), R. L. Klein, J. M. Porquez and G. M. Homer. *Ann. Surg.* 175(1):15-18, 1972.

Subjects were dogs with experimentally-created acute hemorrhagic pancreatitis, acute edematous pancreatitis, perforated peptic ulcer, small bowel obstruction, superior mesenteric vein or artery occlusion, jejunal strangulation, and sham-laparotomized controls. Human subjects consisted of patients admitted for elective surgery and those with clinical entities similar to those created experimentally in dogs. In the control dogs there was no elevation of either serum amylase (normal of 100-950 units) or methemalbumin (0-8 mg/100 ml). Dogs with acute edematous pancreatitis had rises in serum amylase to a maximum of 2500 units; this began 12 hr postoperatively and returned to normal by 48 hr. Methemalbumin levels remained normal, never exceeding 6 mg/100 ml. All dogs with acute hemorrhagic pancreatitis showed increased levels of methemalbumin ranging from 25-125 mg/100 ml; these began to rise 15 hr postoperatively and remained elevated for 6 days. Although 70% of dogs with other procedures had elevated amylase levels, none had methemalbumin levels above 8 mg/100 ml. None of the human controls showed a rise of either amylase (less than 140 mg/100 ml) or methemalbumin (less than 8 mg/100 ml). All 15 with acute edematous pancreatitis developed amylase levels of 400-3200 units, while none had elevated methemalbumin levels. All 5 with acute hemorrhagic pancreatitis had elevated amylase (750-2800 units) and elevated methemalbumin (50-170 mg/100 ml) levels. Levels increased at 15-18 hr after onset of illness and remained up for 6 days. Although 50% of the other patients had elevated amylase levels, none showed elevations of methemalbumin.

9621 URGENT PANCREATECTOMY IN ACUTE PANCREATITIS. (Ger.) Hollender, L. F. (Univ. Hosp. Ctr., Strasbourg, France), M. Gillet and J. J. Kohler. *Langenbecks Arch. Chir.* 328(4):314-327, 1971.

Evaluation of results of early total or subtotal pancreatectomy performed several hr to 3 days after admission on 17 patients with necrotizing hemorrhagic pancreatitis revealed that 5 of 6 with acute postoperative and 6 of 11 with acute primary pancreatitis survived. The importance of early, extensive surgery in cases of postoperative pancreatitis is stressed. In acute primary pancreatitis surgical intervention also seems indicated if symptoms do not subside within 8-12 hr. Acute diffuse pancreatitis affecting the whole organ is an indication for subtotal pancreatectomy; if the pancreatic head alone is affected, necrotic areas are removed. Complications and surgical techniques of sequestrectomy, left partial pancreatectomy and duodenopancreatectomy are discussed, and it is suggested that the latter is usually not justified in the acute phase since mortality is high. Only 1 of 3 patients survived the procedure.

9622 MYOCARDIAL INFARCTION AND ACUTE PANCREATIC DISEASE. (Fr.) Denis, B., E. Lanney De Courten and M. Rival. *Grenoble Med. Chir.* 9(10):379-384, 1971.

9623 ACUTE PANCREATITIS IN PREGNANCY. (Ger.) Tornoczky, J. (Country Hosp., Szekszard, Hungary). *Zentralbl. Gynaekol.* 93(20):693-699, 1971.

9624 THE IMPORTANCE OF WHOLE ABDOMEN AND LUNG X RAYS IN THE DIAGNOSIS OF ACUTE PANCREATITIS. (Ger.) Gay, B. (Martin Luther U. Surg. Clin., Halle, Germany) and H. G. Baars. *Dtsch. Gesundheits* 26(22):1010-1013, 1971.

9625 THE PROGNOSIS OF ACUTE PANCREATITIS. (Ger.) Latotzki, H. (Ernst Moritz Arndt U. Med. Clin., Greifswald, Germany) and C. Thiele. *Z. Gesamte Inn. Med.* 26(12):405-407, 1971.

9626 FEATURES OF CHRONIC PANCREATITIS IN ELDERLY PATIENTS. (Rus.) Valenkevich, L. N. *Ter. Arkh.* 43(6):49-51, 1971.

9627 BEHAVIOR OF NONSPECIFIC PHOSPHATASES IN THE KIDNEYS IN THE COURSE OF ACUTE EXPERIMENTAL PANCREATITIS IN DOGS. (Pol.) Musiatowicz, B. (Med. Acad. Inst. Pathol. Anat., Bialystok, Poland), J. Popow and A. Gabryelewicz. *Patol. Pol.* 22(3):429-437, 1971.

9628 HYPERTENSION OF THE SUPERIOR MESENTERIC VEIN IN CHRONIC PANCREATITIS. (Fr.) Ribet, M. (CHU Surg. Clin., Lille, France), P. Quandalle and C. L'Hermine. *Chirurgie* 97(4):273-282, 1971.

9629 ANEURYSM OF THE GASTRODUODENAL ARTERY AND CHRONIC PANCREATITIS. (Fr.) Blanchon, P. (Bicetre Hosp., Kremlin Bicetre, France), M. Hivet and F. Potet. *Ann. Med. Interne (Paris)* 122(2):225-231, 1971.

9630 DIFFERENTIAL DIAGNOSIS OF CHRONIC PANCREATITIS AND CANCER OF THE PANCREAS. (Rus.) Malinovski, N. N., V. I. Sokolov and R. K. Vasiliev. *Sov. Med.* 34(5):82-87, 1971.

9631 PRIMARY CAUSE OF UNSUCCESSFUL LIVER AND HEART PRESERVATION: COLD SENSITIVITY OF THE ATPase SYSTEM. (E.) Martin, D. R., D. F. Scott, G. L. Downes and F. O. Belzer (U. California Med. Ctr., San Francisco). *Ann. Surg.* 175(1): 111-117, 1972.

After whole organ perfusion during hypothermic (10° C) conditions for 24 hr, 21% of tissue potassium was lost from the kidney slices, and under similar conditions, the heart lost 35.8% and the liver lost 53.5%. Coincident sodium gains were 45.9, 132.5 and 196% in kidney, heart and liver, resp. Ouabain inhibition of the ATPase system at 10° C caused a significant efflux of potassium from kidney cortex slices, but not liver or heart slices, suggesting that the kidney was the only organ in which the energy-dependent cation transport system was active at 10° C. Kidney cortex slices showed a significant ouabain effect on potassoum efflux from 10° to 37° but not at 0° C; maximum retention of tissue potassium was seen at 20° C. In contrast, liver slices showed a ouabain effect only at 20° C and at 37° C. The high intrinsic cold sensitivity of cation transport in liver and heart may explain the poor preservation characteristics of liver and heart.

9632 ELECTROSURGERY IN RESECTIONS OF THE LIVER. AN EXPERIMENTAL STUDY. (E.) Kluge, T. H. (Inst. Med. Sci., San Francisco, Calif.) and S. R. Ullal. *Am. J. Surg.* 122(6): 792-796, 1971.

The use of electrosurgery in liver resection was evaluated in dogs. Parenchymal bleeding was easily controlled by use of electrocautery during resection. The larger central vessels of each lobe were the only source of major hemorrhage and they were clamped and cauterized without the use of sutures or hemoclips. After resection, the hemostasis was complete in all instances, without oozing of blood or bile. At autopsy 1 day to 3.5 months after surgery, there were varying degrees of adhesions around the liver; however, the transected surfaces were dry and without signs of necrosis or infection. After the fourth day, signs of healing were observed; and at three weeks, this appeared to be complete. The surface was peritonealized in areas which were not covered by adhesions. Regeneration of liver tissue was apparent from the first week onwards. Thus, resection by electrosurgery may be valuable in controlling leakage from the hepatic parenchyma.

9633 HEPATIC LIPOGENESIS IN TWO CASES WITH INSULIN-PRODUCING TUMOR OF THE PANCREAS. (E.) Scherstén, T. (Sahlgrenska Hosp., Goteborg, Sweden), S. Nilsson and J. Jönsson. *Acta Med. Scand.* 190(5):353-357, 1971.

The incorporation rate of glycerol-1,3-^{14}C and fructose-U-^{14}C into glycerides and fatty acid moiety of glycerides was determined in liver slices obtained from liver biopsies taken at operation of 2 patients with insulin-producing tumor of the pancreas. The relative incorporation of label into the fatty acid moiety of glycerides from both substrates was similar to that in the fasting (non-fructose-pretreated) controls. The incorporation rate of glycerol into phospholipids was lower and the incorporation rate of fructose into triglycerides higher in liver slices from fructose-loaded controls than from fasting control. In patients with insuloma, the incorporation rate of glycerol and fructose did not differ from controls. Chronic hyperinsulinemia without increased concentration of plasma glucose does not promote hepatic lipogenesis in man.

9634 RENAL CLEARANCES OF DIFFERENT AMINO ACIDS IN WILSON'S DISEASE BEFORE AND AFTER TREATMENT WITH PENICILLAMINE. (E.) Schønheyder, F. (Aarhus U. Inst. Med. Biochem., Denmark), G. Gregersen, H. E. Hansen and P. E. Skov. *Acta Med. Scand.* 190(5):395-399, 1971.

Two siblings with Wilson's disease displayed no neurological symptoms and only minor hepatic dysfunction. Decreased tubular reabsorption of phosphate and urate were found and remarkedly high clearances of threonine, glycine, alanine, valine, tyrosine, and histidine were observed in one or both patients before treatment with penicillamines. The effect of penicillamine in decreasing the high amino acid clearances in these patients was most remarkable during the first 6 mo of treatment. An improvement of the tubular reabsorptive capacity probably means that copper is being removed from the tissues; penicillamine treatment did not give rise to proteinuria or aminoaciduria.

9635 PENTOSE PHOSPHATE METABOLISM OF ERYTHROCYTES IN HEPATIC PORPHYRIAS. (E.) Markkanen, T. (U. Turku Dept. Med. Microbiol., Finland), O. Peltola and P. Koskelo. *Acta Haematol.* 46(3):142-148, 1971.

Five of 13 patients with hepatic porphyria had an RBC transketolase activity level at or below the minimum limit of normal range. Another 4 patients had lowered enzyme activity if the borderline areas are included. Four of 5 patients with acute intermittent porphyria who were having an acute attack showed definite pathologically low levels. In 3 patients with porphyria variegata the disease was latent and their transketolase levels were normal. In 2 patients with porphyria cutanea tarda both of whom had symptoms, the enzyme activity was low or within borderline area. In 1 patient the transketolase activity was observed during manifestation of clinical symptoms and during convalescence. In 10 mo his transketolase activity gradually climbed to low normal range. Two relatives of this patient with porphyria showed pathologically low RBC transketolase activity.

9636 ABNORMAL PROJECTIONS OF BILE CANALICULI IN LIVER BIOPSIES. (Ger.) Horváth, A. (City Hosp., Bratislava, Czechoslovakia), J. Horváthová, E. Brixová and M. Lukáč. *Virchows Arch. [Pathol. Anat.]* 354(1):35-43, 1971.

Abnormal projections in the network of bile canaliculi (19 extensive, 35 moderate, 41 slight) were found in 95/175 evaluated needle biopsies obtained from patients with various liver diseases. Other types of canalicular abnormalities were found in 50 of 95 with abnormal projections and in 22 without such projections. The predominantly focal changes were divided into 4 groups based on intensity and extent of abnormality. Maximal changes were observed most frequently in complicated fatty liver (25 with formation of projections, 28 without), chronic hepatitis with cirrhosis (20 and 5, resp.) and uncomplicated fatty liver (13 and 20, resp.). A normal canalicular network was seen in 58 of 175 biopsies. It is suggested that the formation of the abnormal canalicular projections is multifactorial in origin but probably due mainly to hepatocellular damage with obstruction. The relationship of these morphologic changes to other histological findings in the liver is briefly discussed.

9637 THE STRUCTURE OF LIVER IN ACROMEGALY. (Ger.) Täger, B. (U. Saarland Pathol. Inst., Hamburg, Germany). *Acta Hepatosplenol. (Stuttg.)* 18(5):341-347, 1971.

An enlarged liver (weighing 3400 g) obtained at autopsy 10 weeks after removal of an eosinophilic pituitary adenoma from a 59-yr-old patient with acromegaly was compared with 6 normal livers from age-matched subjects. Edema was not present (water content 75.6% of the weight, as compared to 68-83% for normal livers). Hepatic lobules were enlarged to 150% of normal values. The amount of connective tissue was significantly increased in relation to whole tissue mass (21.8% as compared to 11.6% in controls). There was no significant difference in karyogram and a relatively large number of high-ploidy nuclei. The volume of nuclei in acromegaly was 6,940 cubic microns (μ^3) for class I, 13,670 μ^3 for class II as compared to 5,520 μ^3 and 10,990 μ^3, resp., in controls. It is concluded that the enlarged liver in acromegaly is the result of increased number of cells with increased size of lobules but does not represent an increased functional activity of the organ.

9638 ARTERIOVENOUS SHUNTING IN A REGENERATING LIVER SIMULATING HEPATOMA. REPORT OF A CASE. (E.) Farrell, R. (Philadelphia Gen. Hosp., Pa.), A. Steinman and W. H. Green. *Radiology* 102(2):279-280, 1972.

A case is reported of a 47-yr-old white male with a history of heavy alcohol consumption who presented in congestive heart failure with visible neck vein distention at 45°, a positive hepatojugular reflux, a liver edge palpable 6-8 cm below the right costal margin, 2-3^{+} pitting edema bilaterally, a caput medusae, palmar erythema and spider nevi. Hemoglobin ranged from 14.0-17.5 g/100 ml, hematocrit from 45-58%. Liver function studies were suggestive of hepatocellular disease. The clinical picture of cirrhosis and a liver scan with lateral filling defects suggested the possibility of a hepatoma. Celiac arteriography revealed marked arteriovenous shunting, portal vein filling and an area of staining with some irregular vessels suggestive of tumor. At exploratory laparotomy there was found to be a diffuse micronodular pattern to the entire liver, with several superimposed macronodules on the surface of the right lobe. A 5-cm nodule on the surface of the right lobe was wedge-resected and the pathology report was of active irregular cirrhosis with regenerating liver.

9639 SERUM AMYLASE ACTIVITY IN LIVER DISEASE. (E.) Bhutta, I. H. (Dow Med. Coll., Karachi, Pakistan) and M. A. Rahman. *Clin. Chem.* 17(12):1147-1149, 1971.

A number of diseases are reported to be associated with subnormal amylase activity. Liver amylase, which differs structurally and immunologically from salivary and pancreatic amylase, may contribute to blood amylase and the liver may be an important site for extrapancreatic regulation of amylase activity. This study measured the serum amylase activity on 15 normal subjects and in 60 patients with liver disease. The extent of liver damage was determined by serum bilirubin and thymol turbidity values. The 60 diseased patients consisted of 27 with infectious hepatitis, 18 with cirrhosis, 7 with jaundice, and a heterogenous group of 8 patients. Each group of diseased patients had serum amylase values that were well below normal values. Amylase activity was related to the degree of liver dysfunction and serum amylase decreased as bilirubin and turbidity values increased. It is postulated that this decrease in amylase activity is a direct consequence of inhibition of amylase synthesis by the liver.

9640 PERFUSION OF THE ISOLATED PIG LIVER WITH HUMAN BLOOD. (E.) Hickman, R. (U. Cape Town Dept. Surg. Med., South Africa), S. J. Saunders, N. E. Goodwin and J. Terblanche. *J. Surg. Res.* 11(11):519-527, 1971.

The biochemical response of the isolated pig liver to perfusion with heterologous human blood (types O,A,B and AB) was studied using porcine blood perfusion as a control. During perfusion, a marked response was observed in the resistance of the portal circulation, however, this response decreased with time. Hepatic parenchymal cell damage was indicated by the release of intracellular potassium and a separate transaminase. When blood of groups A,B, and AB was used, a conjugated hyperbilirubinemia was observed and higher levels of circulating plasma hemoglobin were noted than when group O blood was used. Perfusion with human blood had no effect on the clearance of a load of sodium lactate and ammonium citrate. Thus, the use of porcine livers for hepatic-assist purposes is not militated against by these findings, especially since this procedure may reverse some of the neurological complications of hepatic coma.

9641 HEMODYNAMIC CHANGES IN CLINICAL ORTHOTOPIC LIVER TRANSPLANTATION. (E.)

Pappas, G. (U. Colorado Sch. Med., Denver), W. M. Palmer, G. L. Martineau, C. G. Halgrimson, I. Penn, C. G. Groth and T. E. Starzl. *Surg. Forum* 22:335-336, 1971.

Significant cardiohemodynamic depression occurred in 7 patients (3 children, 4 adults) with cirrhosis and portal hypertension during the anhepatic phase of liver transplantation. During the simultaneous cross clamping of the portal vein and inferior vena cava, the cardiac and stroke indices decreased sharply and peripheral vascular resistance increased considerably. A slight drop in arterial blood pressure and an increase in pulse rate also occurred at this time. The changes in hemodynamics observed during the anhepatic phase and mobilization of the liver returned to control values once revascularization of the new organ had been accomplished. The anhepatic period is a critical intraoperative time, during which appropriate monitoring and therapy are essential.

9642 INVESTIGATIONS OF DOSE, AGE, AND DURATION OF ADMINISTRATION ON THE HEPATORENAL DAMAGE INDUCED IN MICE BY CULTURAL PRODUCTS OF Penicillium viridicatum. (E.)

Budiarso, I. T. (Bogor Inst. Agric. Sci. Fac. Vet. Med., Indonesia), W. P. Carlton and J. Tuite. *Toxicol. Appl. Pharmacol.* 20(3):357-379, 1971.

The results of this study suggest that mice fed varying concentrations of the cultura products of the fungus Penicillium viridicatum had an LD_{50} at 14 days, based on hepatic lesions, of between 10 and 15% concentration. Findings at necropsy included loss of adipose tissue, dehydration, jaundice, foci of necrosis in the liver, and green kidneys. A second part of the study measured age with susceptibility. Mice from 3 through 6 wk of age were noted to have necrosis of the hepatic parenchyma, bile ducts and associated portal structures. Mice from 8 through 18 wk had, in addition to the above lesions, proliferation of the bile ducts with hypertrophy and hyperplasia of duct epithelium. Cellular exudates and granulation tissue was abundant around the bile ducts. Bizarre liver giant cells were noted and hypertrophy of liver cells was noted near the portal areas. Renal lesions declined as feeding time progressed when the life span and pathogenesis of the lesions was explored in subsequent parts of the study. Anemia was also noted. A number of antibiotics and other metabolites have been isolated from the fungus but the cause of the toxicity has not been determined.

9643 A CHROMATOGRAPHIC STUDY OF LIPIDS AND FATTY ACIDS IN THE LIVERS OF ALCOHOLIC PATIENTS WITH FATTY DEGENERATION OF THE LIVER. (Fr.)

Bertrand, J.-L. (Antiqualle Hosp., Lyon, France), R. Mallein, P. Sabater and R. Brette. *Arch. Fr. Mal. App. Dig.* 60(8-9, Suppl. 3):219-224, 1971.

Puncture biopsy specimens of the livers of 20 alcoholic patients with marked fatty degeneration of the liver were subjected to both thin-layer and gas chromatography. As compared to 9 normal controls, a significant increase of triglycerides was demonstrated, accompanied by a highly significant increase of oleic and palmitoleic acids, a significant decrease of arachidonic acid, and a highly significant decrease of linoleic acid. Identical changes were found in biopsy specimens from 5 alcoholic patients with only a mild degree of fatty degeneration, but not in those from 4 patients with infectious hepatitis or (with the exception of a decrease of arachidonic acid) in those from 9 alcoholic patients with cirrhosis of the liver. No significant changes were found as concerned the other mono-unsaturated or polyunsaturated fatty acids, free fatty acids, monoglycerides, diglycerides, cholesterol esters, or steroids.

9644 THE RESULTS OF SELECTION OF PATIENTS FOR PORTAL-SYSTEMIC SHUNT. (E.)

Hermann, R. E. (Cleveland Clin. Found., Ohio) and P. C. Taylor. *Surg. Gynecol. Obstet.* 133(6):1008-1112, 1971.

A study of 84 patients. Indications for the shunt were bleeding varices in 79 patients, medically intractable ascites in 3, and prophylaxis in 2 patients. The end-to-side portacaval shunts in 70 patients and side-to-side portacaval shunts in 3 patients resulted in no recurrent bleeding from varices. Three of 9 patients with splenorenal shunts had bleeding due to thrombosis of the shunt. These results were then compared to the results of a prior study of 76 patients who were relatively unselected. Selection factors of good liver function, avoidance of emergency shunt, and age under 60 years have reduced the mortality from 26 to 11%. The 5-yr survival rate increased from 45 to 57%. Postshunt problems of encephalopathy, ascites, and jaundice remained with an incidence of encephalopathy of 24%. When shunt procedures were not performed an average 5-yr survival of 20% or less was noted.

9645 SUSPENSION STABILITY OF HEPATIC BILE IN PATIENTS RECEIVING TAURINE AND BSP. (E.) Masur, R. (State U. New York Downstate Med. Ctr., Brooklyn), J. Patti and B. Gardner. *Surg. Forum* 22:373-376, 1971.

Three days after a cholecystectomy and choledochostomy, 6 patients were injected with BSP (5 mg/kg i.v.) and the following day were started on taurocholic acid (1.5 g/day for 3 days) feeding; timed bile samples were collected to determine the effect of the taurine intake and BSP excretion on the suspension stability of bile. Excretion of BSP decreased the glycine-taurine conjugation ratio, but did not alter phospholipid or cholesterol excretion and only slightly increased the zeta potential. During taurocholic acid feeding, the glycine-taurine ratio decreased further and the zeta potential was significantly increased, suggesting that the substitution of glycine for taurine results in a more stable micellar solution. Excretion of taurine- and glycine-conjugated salts also increased and triordinate calculations shifted towards the zone of stabilization, despite the increased cholesterol concentration induced by the taurocholic acid feeding.

9646 MECHANISM OF ACTION OF L-DOPA IN HEPATIC COMA. (E.) Fischer, J. E. (Massachusetts Gen. Hosp., Boston) and J. H. James. *Surg. Forum* 22:347-349, 1971.

Patients in hepatic coma had a significantly higher 24-hr urinary excretion of octopamine than did controls and patients with asymptomatic liver diseases; patients with asterixis showed intermediate values. Rats in acute hepatic coma, induced by a 2-stage ligation of hepatic vasculature, showed much higher brain levels of octopamine than did the sham controls. Two months after end-to-side portacaval shunts, rats were fed phenylalanine or phenylethylamine, which can penetrate the blood-brain barrier; the shunted rats had elevated brain levels of octopamine when compared to sham-operated controls receiving similar doses. It is suggested that sympathomimetic amines, such as octopamine, might replace norepinephrine and dopamine in the brain tissue during hepatic coma; these false adrenergic neurochemical transmitters have only weak adrenergic action and could result in cerebral mentation. The treatment of patients in hepatic coma with large doses of L-dopa, a precursor of the normal transmitters, might shift the equilibrium so that normal amounts of norepinephrine and dopamine are restored.

9647 THE HEPATIC WEDGE PRESSURE AND VENOGRAM vs. THE INTRAPARENCHYMAL LIVER PRESSURE AND VENOGRAM. (E.) Ruzicka, F. F., Jr. (St. Vincent's Hosp., New York, N. Y.), F. J. Carillo, D. D'Alessandro and P. Rossi. *Radiology* 102(2): 253-258, 1972.

Hepatic vein wedge pressures were obtained in 20 patients, and in 19, free hepatic vein, right atrial and/or inferior vena cava pressures were also recorded. Percutaneous intraparenchymal pressure was recorded in 14 and hepatic wedge venography and intrahepatic parenchymal venography were performed on both serial films and cine. Techniques are described for both the percutaneous transthoracic intraparenchymal and percutaneous femoral hepatic wedge studies. In a comparison of the intrahepatic and wedge pressure measurements in 14 patients, there were no significant differences in 11, while in the remaining 3, the differences were 11, 8.5 and 14 mm, resp., and this was due in each case to technical problems. The percutaneous intrahepatic method was subject to more technical difficulties than the wedge technique, and these included the need for greater patient cooperation, kinking of the catheter between the liver and the chest wall (especially in the presence of ascites), accidental placement of the single-end-opening catheter tip against a vein wall within the liver, a chance of a too superficial placement of the catheter tip in the liver, or its placement in an area of marked fibrosis. The venographic pattern with these 2 techniques was similar in most respects.

9648 THE INCIDENCE OF HEPATOMA AND CIRRHOSIS OF THE LIVER IN AUTOPSY MATERIAL. CHANGES SEEN IN THE COURSE OF 20 YEARS. (Fr.) Schmitz, A. (U. Liege Lab. Pathol. Anat., Belgium). *Acta Gastroenterol. Belg.* 34(7):523-535, 1971.

A retrospective study of 7796 autopsies of adults over 20 yr of age, made at the University of Liege between 1941-50 inclusive (1988 cases) and 1951-69 inclusive (5808 cases) showed a total percentage incidence of all forms of cirrhosis of the liver of 1.6% for the first period and 4.5% for the second period, resp., with 62% of the cases occurring in males. When the period 1951-69 was broken down into 5-yr intervals, the incidence increased progressively from 1.66% (1951-55) to 5.52% (1966-69), with the proportion of male subjects remaining essentially unchanged. Beginning in 1956, the percentage incidence of postnecrotic cirrhosis showed a highly significant increase, accounting for virtually all of the increase for all forms of cirrhosis and appearing to correlate directly with increased consumption of alcohol. During the same interval, the incidence of hepatoma among all patients autopsied rose progressively from 0.4% (1956-60) to 0.75% (1966-69). Among cirrhotic patients, it increased from 8.0% to 12.5%, resp., apparently primarily in patients with post-hepatic cirrhosis.

9649 OUR EXPERIENCE WITH THE INDIRECT IMMUNOFLUORESCENT REACTION IN AMEBIC DISORDERS. BASED ON 150 CASES. (Fr.) Molinier, A. (Rambouillet Hosp., France), G. Mimoune and A. Supiot. *Arch. Fr. Mal. App. Dig.* 60(10-11): 535-546, 1971.

Serum immunofluorescence was demonstrable at a dilution level of 1:3200 in a patient with amebae-induced abscess of the liver; at a level of 1:200 in 2 of 3 patients with subacute amebic hepatitis, although the third patient failed to show the reaction at any dilution level, as did 7 of 18 with hepatomegaly or hepatalgia due to confirmed amebic infestation of the liver. Among 11 of 18 remaining in this group, 102 patients with colonic infestation, and 16 with other, related disorders resulting from the presence of amebae, a positive reaction at dilution levels of 1:50 to 1:100 was found to be reliably presumptive evidence of latent amebiasis or the presence of residual antibodies induced by a prior infestation. A positive reaction at a dilution level of 1:200 indicated mildly progressive infestation; at a level of 1:400, it indicated moderately to strongly progressive infestation. No serum immunofluorescence was demonstrable in 38 of 102 patients with coprologically confirmed (78) or strongly indicated (24) colopathies of amebic origin, or in 12 of 26 with coprologically confirmed amebic dysentery. It was concluded that serum immunofluorescent studies should be considered a complement to coprology, rather than a substitute.

9650 LYMPHOCYTE TRANSFORMING ACTIVITY IN THE SERUM OF PATIENTS WITH HEPATIC DISEASE. (E.) Kissling, M. (Acad. Hosp., Leiden, Netherlands) and B. Speck. *Vox Sang.* 21(3): 261-268, 1971.

Twenty-five of the 27 sera of patients with hepatic disease caused normal lymphocytes to become blastoid and undergo mitosis, as measured by increased uptake of ^{3}H-thymidine and ^{3}H-cytidine. Maximally increased RNA synthesis was demonstrated 1-2 days after starting the cultures of normal lymphocytes with stimulating sera. Most active DNA synthesis was found on the third to fourth day. Since most sera had a comparable transforming effect and only 2 were Australia antigen-positive, this antigen probably has no direct effect on transformation. The transforming factor apparently rests in the globulin fraction.

9651 STUDIES ON DRUG-INDUCED LIPIDOSIS. III. LIPID COMPOSITION OF THE LIVER AND SOME OTHER TISSUES IN CLINICAL CASES OF "NIEMANN-PICK-LIKE SYNDROME" INDUCED BY 4,4'-DIETHYLAMINOETHOXYHEXESTROL. (E.) Yamamoto, A. (Osaka U. Med. Sch., Japan), S. Adachi, K. Ishikawa, T. Yokomura, T. Kitani, T. Nasu, T. Imoto and M. Nishikawa. *J. Biochem. (Tokyo)* 70(5):775-784, 1971.

Free cholesterol and phospholipid content increased in all livers from patients with a Niemann-Pick-like syndrome induced by 4,4'-diethylaminoethoxyhexestrol. Phospholipid analysis showed a marked increase in lysobisphosphatidic acid and phosphatidylinositol. Phosphatidylethanolamine and cardiolipid were considerably decreased in all cases. The concentration of lysobisphosphatidic acid seems to be related to the amount of intracellular particles with laminated structures, seen most clearly in the liver but also in the spleen and lymph nodes. Accumulation of 4,4'-diethylaminoethoxyhexestrol was detected by thin-layer chromatography of total lipid; gas chromatography revealed increased desmosterol in tissues and blood serum. The syndrome resembles Niemann-Pick disease in some respects. "Foam cell syndrome" probably includes a wide variety of storage diseases belonging to the same spectrum in which disorders of metabolism of cholesterol, sphingomyelin or other substances of lipid nature are involved.

9652 PHOSPHOLIPIDS OF CHOLESTASIS. ABNORMAL LIPOPROTEINS OF FATTY ACID COMPOSITION. (Fr.) Picard, J. (CHU Biochem. Med. Lab., Paris), D. Veissiere, F. Voyer and G. Bereziat. *Clin. Chim. Acta* 36(1):247-250, 1972.

Immunologically specific abnormal lipoproteins were isolated from patients with cholestasis. These abnormal lipoproteins were also identified by ultracentrifugation and gel filtration and contained a high proportion of phospholipids, especially phosphatidylcholine (73%). Other constituents of the abnormal lipoprotein were sphingomyelin, 13%; phosphatidylethanolamine, 8.3% and lysolecithin 5.7%. The ratio of polyunsaturated to monosaturated fatty acids in phospholipids of normal serum lipoproteins was presented and contrasted with the abnormal lipoproteins. No 10- or 12- carbon fatty acids were found in the abnormal lipoproteins and differences in the percentage of other fatty acids were noted. A high amount of monounsaturated fatty acids and a low amount of polyunsaturated fatty acids was found in the abnormal lipoproteins and the hepatic bile.

9653 COLLATERAL ARTERIAL BLOOD SUPPLY OF THE LIVER AFTER HEPATIC ARTERY LIGATION, ANGIOGRAPHIC STUDY OF TWENTY PATIENTS. (E.) Plengvanit, U. (Siriraj Hosp., Bangkok, Thailand), O. Chearanai, K. Sindhvananda, D. Damrongsak, S. Tuchinda, and V. Viranuvatti. *Ann. Surg.* 175(1): 105-110, 1972.

Twenty patients with primary carcinoma of the liver were treated with ligation of hepatic artery. One pathway of collateral circulation was demonstrated in 9 patients, 2 in 7, 3 in 2 and 4 pathways in 1 patient. Collateral arterial circulation through the right inferior phrenic and subcostal arteries were the most common pathways encountered in 9 cases. Other collateral vessels were gastroduodenal and branches, inferior pancreaticoduodenal, splenic and left gastric arteries. These vessels usually showed enlargement. The collaterals developed rapidly as early as 1 wk after ligation and their blood flows to the liver in all directions. The intrahepatic anastomosis is extensive, demonstrating that wherever the collateral circulation enters the liver, it can supply both lobes of liver.

9654 HEPATIC COMPETITION IN AUXILIARY ALLOTRANSPLANTATION. (E.) Sawada, M. (Columbia U. Coll. Physicians Surg., New York, N. Y.), J. B. Price, Jr., K. Takeshige and A. B. Voorhees, Jr. *Surg. Forum* 22:344-345, 1971.

In order to test the concept of nonspecific functional competition of 2 livers in 1 animal, a group of 65 dogs were given hepatic allografts with hepatic arterial inflow, hepatic vein drainage into the vena cava and gallbladder anastomosis to the duodenum. The host livers were "handicapped" by a common bile duct ligation in combination with an end-to-side portacaval shunt or a 70% resection or both. Immunosuppression was accomplished by the administration of azathioprine and methylprednisolone. In dogs receiving portacaval shunts, both the graft weight and host liver weight significantly decreased, while in dogs with resections, both the graft and host liver weights increased. In animals undergoing both a resection and a shunt, graft weights decreased markedly and host liver weights increased slightly. It is concluded that the functional competition concept does not apply to the allograft system, since increased damage to the host liver did not result in an improved transplant.

9655 THE LIVER SCAN IN PATIENTS WITH CANCER: HISTOLOGIC CORRELATION. (E.) Volpe, J. A., R. J. Lull and M. L. Nusynowitz (William Beaumont Gen. Hosp., El Paso, Tex.). *J. Surg. Oncol.* 3(6):649-655, 1971.

The value of liver scanning in patients with proven malignant disease was assessed by correlating histologic results with scan interpretation in 63 patients. Positive scan-histology correlation was observed in 56 of the 63 cases (89%), while positive correlations were observed between scan and autopsy findings in 44 of 46 cases (96%). Neither scan patterns nor liver function studies enabled differentiation between tumor and nontumor pathology. Percutaneous biopsy was insensitive, yielding false-negative results in 40% of the cases. The value of the liver scan in patients with cancer seems to be limited and it cannot be used as a gauge for therapy or prognosis unless it is normal. An abnormal scan is apparently nonspecific whether the abnormality is focal or diffuse. Metastases may or may not be present. One exception, however, is found when the alkaline phosphatase is markedly elevated and a focal defect is noted on the scan. The presence of hepatic metastases is virtually certain.

9656 UTILITY OF COMBINED HEPATIC SCINTIPHOTOGRAPHY AND ARTERIOGRAPHY: CASE EXAMPLES OF CIRRHOSIS, HEPATOMA, AND AMEBIC ABSCESS. (E.) Jones, A. E. (Walter Reed Gen. Hosp. Washington, D. C.) and J. L. Montgomery. *J. Surg. Oncol.* 3(6):657-663, 1971.

A report of 3 cases with hepatic lesions which posed a problem in differentiation by hepatic scintiphotography alone, but were resolved by hepatic arteriography. In the case of cirrhosis, scintiphotography showed hepatomegaly and a diffuse irregularity of distribution of ^{99m}Tc sulfur colloid throughout the liver with an abnormal area at the lateral edge of the dome of the right lobe and another within the upper part of the left lobe. The hepatic arteriogram showed a corkscrew appearance of the intrahepatic arterial branches and often a mottled appearance in the hepatogram phase. Hepatoma was an extremely vascular lesion characterized by enlarged intrahepatic arterial branches, arteriovenous shunting, neovascularization, and a persisting pool of contrast medium. Amebic abscess was seen as a well-circumscribed avascular area which caused stretching of intrahepatic arteries with a blush surroudning the abscess cavity in the hepatogram phase. Further evaluation of abnormal hepatic scintiphotos by hepatic arteriography appears useful in clarifying false-positive scans in select cases.

9657 THE ANGIOGRAPHIC APPEARANCE OF PRIMARY AND SECONDARY TUMORS OF THE LIVER. (E.) Watson, R. C. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.) and H. A. Baltaxe. *Radiology* 101(3):539-548, 1971.

Selective arteriography was performed in all but 2 (both of whom had only an aortogram) of 78 patients with benign or malignant primary (35) or secondary metastatic (43) tumors of the liver as proven by laparotomy, biopsy, excision or autopsy. Hepatic enlargement was noted in 64 but bore no relation to whether the tumor was primary or secondary. Cirrhosis was seen in only 14% of hepatomas. Caudad displacement of the right kidney was noted in 28 cases but was related only to the extent of tumor involvement of the liver. In 3 the right kidney was displaced cephalad. Splenomegaly was noted in 35 (17 primary, 18 secondary), and was not related to the type of tumor, but instead to either extensive replacement of hepatic parenchyma with tumor or invasion of the portal venous system by tumor. There was only 1 case of thrombus formation visualized within the portal vein. Markedly vascular tumors tended to be hepatomas with 19 of 24 hepatomas (76%) having a vascularity index of 3 or 4 (on a subjective scale of 0-4). Moderate vascularity (1 or 2 on this scale) was seen in 30 of 43 (70%) metastatic tumors. Stretching and deviation of vessels was solely a function of tumor size. Delayed emptying of tumor vessels was seen in 87% of cases, and most likely represents an aspect of neovascularization rather than tumor type. Arteriovenous fistulae were noted in 2 cases of hepatoma (both with underlying liver disease) and 1 case of metastatic prostatic carcinoma. Degree of necrosis was a useless criterion. Obstruction, deviation or compression of the portal vein was more common with primary tumors. Tumor position added nothing. Of 25 cases with enlargement of major vessels, 18 were in primary and 7 in secondary tumors and this was not related to vascularity, but body size is considered more important than tumor type. Hepatomas were more common in the young (16 males, 8 females; 50% less than 50 yr old), and metastatic tumors more common in the elderly.

9658 CHOLESTASIS IN PATIENTS WITH AMOEBIC LIVER ABSCESS. (E.) Datta, D. V. (Postgrad. Inst. Med. Educat. Res., Chandigarh, India) and P. N. Chhuttani. *Am. J. Dig. Dis.* 16(11):977-984, 1971.

Hepatic BSP metabolism was studied in 13 patients with amebic liver abscess to understand the relative importance of abnormalities in hepatic storage capacity, transport maximum and conjugation. Jaundice was recorded in 5 patients in whom serum bilirubin was above 2.9 mg%. Hypoalbuminemia and hyperglobulinemia were observed in most of the patients. Mean plasma BSP retention at 45 min was higher in patients with amebic liver abscess than in normal controls. While mean storage capacity for BSP was normal, the mean transport maximum in patients with amebic abscess was significantly lower than in normal controls. Mean conjugated BSP was at least twice that of normal controls after the first, second and third hr of infusion. Though 45-min BSP retention showed no significant correlation with storage capacity, there was a significant negative correlation with transport maximum. BSP studies in 7 patients after the completion of therapy revealed a return to normal in 45-min BSP retention, no change in storage capacity, and a significant rise in transport maximum. Other biochemical liver function tests also showed improvement in these 7 patients.

9659 WILSON'S DISEASE WITH REVERSIBLE RENAL TUBULAR DYSFUNCTION. CORRELATION WITH PROXIMAL TUBULAR ULTRASTRUCTURE. (E.) Elsas, L. J. (Yale U. Sch. Med., New Haven, Conn.), J. P. Hayslett and B. H. Spargo. *Ann. Intern. Med.* 75(3):427-433, 1971.

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9661 THE EFFECT OF LACTOBACILLUS ON BLOOD AMMONIA LEVEL AND LIVER FUNCTION TESTS IN CHRONIC PORTASYSTEMIC ENCEPHALOPATHY. (E.) El Khanagry, H. A. (U. Alexandria Sch. Med., Egypt), Y. M. Abdel Samie, M. El Sayed and W. Kandil. *Alexandria Med. J.* 17(2):176-182, 1971.

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9663 THE VALUE OF PERCUTANEOUS PUNCTURE BIOPSY IN THE DIAGNOSIS OF HEPATIC DISEASES IN INFANCY AND CHILDHOOD. (Ger.) Peley, I. (Pediatr. Hosp., Pecs, Hungary), I. Kadas, M. Simon and G. Kosztolanyi. *Acta Paediatr. Acad. Sci. Hung.* 12(2):105-120, 1971.

9664 RAT LIVER GLYCEROLPHOSPHATE DEHYDROGENASES: ACTIVITY CHANGES AND INDUCTION BY THYROID HORMONE OF THE MITOCHONDRIAL ENZYME IN HEPATOMAS AND IN PRECANCEROUS AND GROWING LIVER. (E.) Karsten, U. (Inst. Circulat. Res., Berlin/Buch), G. Sydow, A. Wollenberger and A. Graffi. *Acta Biol. Med. Ger.* 26(6):1131-1140, 1971.

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9666 THROMBOLYSIS IN BUDD CHIARI SYNDROME DUE TO PARTIAL THROMBOSIS OF THE INFERIOR VENA CAVA AND THE HEPATIC VEINS. (Ger.) Kostering, H. (Univ. Med. Clin., Gottingen, Germany), G. Brunner, P. Heimburg and W. Creutzfeldt. *Dtsch. Med. Wochenschr.* 96(39): 1532-1534, 1971.

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9701 LYMPHATIC DRAINAGE FROM THE LIVER AND ITS REGIONAL (SUPRA AND INFRA DIAPHRAGMATIC) LYMPH NODES. (Ger.) Burgmann, W. (Rheinallee 37, Bonn, Germany). *Med. Welt* 22(36): 1370-1373, 1971.

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See also numbers: 9011, 9018, 9107, 9119, 9122, 9123, 9128, 9137, 9183, 9187, 9189, 9193, 9201, 9202, 9205, 9206, 9218, 9220, 9221, 9226, 9227, 9233, 9236, 9424, 9463, 9481, 9592, 9593, 9612, 9878, 9881, 9883, 9884, 9885, 9890

9709 EFFECT OF PERITONITIS ON MITOCHONDRIAL RESPIRATION. (E.) Decker, G. A. G. (Roy. Victoria Hosp., Montreal, Quebec, Canada), A. M. Daniel, S. Blevings and L. D. Maclean. *J. Surg. Res.* 11(11):528-532, 1971.

The effect of Klebsiella pneumoniae peritonitis on hepatic mitochondrial respiration was studied in male rats. Liver parenchymal cells were studied 18 hr after the injection of the organism or immediately after death. A significant decrease of liver ATP and an increase in AMP were observed in septic rats. In the animals studied at death, these changes were more pronounced, and tissue ADP levels and total adenine nucleotide content were significantly lower than in the livers of normal rats. No significant differences were seen between the normal and the septic groups regarding mitochondrial respiration. The rate of oxygen uptake/mg protein content of the mitochondrial preparation tended to be higher in the septic group. Thus, this model of experimental sepsis does not cause irreversible liver damage to liver mitochondria.

9710 EFFECTS OF AN ORAL CONTRACEPTIVE AGENT ON PLASMA LIPIDS, PLASMA LIPOPROTEINS, THE INTRAVENOUS FAT TOLERANCE AND THE POST-HEPARIN LIPOPROTEIN LIPASE ACTIVITY. (E.) Rössner, S. (U. Uppsala Dept. Obstet. Gynecol., Sweden), U. Larsson-Cohn, L. A. Carlson and J. Boberg. *Acta Med. Scand.* 190(4):301-305, 1971.

The effects of a combined oral contraceptive agent (chlormadinone acetate 3 mg and mestranol 0.1 mg) on plasma lipid and lipoprotein levels were studied in 12 healthy women. During the treatment, all women showed an increase of the plasma triglyceride level, 10 of 12 showed increased cholesterol concentration, and the average concentration of free fatty acids remained unchanged. Very low, low, and high density lipoprotein levels were all significantly increased, the most significant changes being in the very low and low fractions. In the low fractions the percentage of both triglycerides and phospholipids increased, in the high only that of triglycerides. The increase of triglycerides in the very low fraction accounted for about 40% of the total rise of plasma triglycerides. In the high fraction, the concentration of triglycerides increased more than twice. The i.v. fat tolerance was unaffected by the medication. During treatment the post-heparin lipolytic activity was unchanged 5 min after the heparin injection but was significantly lowered after 40 min. Studies with these agents administered alone indicated that it was probably the estrogenic part of the combined drug that was responsible for the alterations of the lipid levels.

9711 TRANSIENT CHOLESTASIS DURING TREATMENT WITH AJMALINE, AND CHRONIC XANTHOMATOUS CHOLESTASIS AFTER ADMINISTRATION OF AJMALINE, METHYLTESTOSTERONE AND ETHINYLESTRADIOL. TWO CASE REPORTS. (E.) Beermann, B. (Sabbatsbergs Hosp., Stockholm), J. L. E. Ericsson, K. Hellström, B. Wengle and B. Werner. *Acta Med. Scand.* 190(4):241-250, 1971.

Two patients (1 male, 1 female) with intrahepatic cholestasis following treatment with ajmaline are described. Upon interruption of therapy, the male patient improved rapidly, his serum bilirubin, alkaline phosphatase and GPT returning to normal within a few days. The female patient was also given a preparation containing methyltestosterone and ethinylestradiol. She developed chronic cholestasis and a clinical syndrome similar to that of xanthomatous biliary cirrhosis which has persisted for 2 yr. Galactose tolerance tests and in vitro methyltestosterone metabolism were normal in this patient. Electron microscopic studies of a liver biopsy taken from this patient revealed many normal hepatocytes and other parenchymal cells which contained vacuoles filled with irregular clumps of electron-dense material. These "whorl bodies" may represent altered, reabsorbed bile. Similar structures were seen in the Kupffer cells and in the extracellular spaces. No evidence of biliary cirrhosis was observed after 1 yr. Thus, the administration of several cholestatic drugs simultaneously may produce a more severe cholestatic disease than occurs when either agent is administered alone.

9712 BREAST-MILK JAUNDICE AND ORAL CONTRACEPTIVES. (E.) Wong, Y. K. (Matern. Hosp., Birmingham, England) and B. S. B. Wood. *Br. Med. J.* 4(5784):403-404, 1971.

A total of 116 mother-infant pairs were studied. Of the 69 non-jaundiced infants, 24 (34.8%) mothers had been on the pill (at least 1 cycle); of 47 jaundiced infants, 33 (70%) mothers had been on the pill. Results suggest a relationship between the pill and idiopathic jaundice in breast fed infants. A total of 18 infants had severe jaundice (bilirubin levels above 15 mg%) on fifth or subsequent days of life; mothers of 14 of these were on the pill. Estriol given either to neonates or mothers 24 hr before delivery has increased plasma bilirubin levels or incidence and levels of subsequent jaundice, resp. The pill became widely used in society at about the same time as breast milk jaundice was first reported.

9713 THE RELATIONSHIP BETWEEN THE CHEMICAL STRUCTURE OF AFLATOXINS AND THEIR EFFECT ON BOVINE PANCREAS DEOXYRIBONUCLEASE. (E.) Schabort, J. C. (Rand Afrikaans U. Dept. Biochem., Johannesburg, South Africa) and M. J. Pitout. *Enzymologia* 41(4):201-216, 1971.

The relationship between the chemical structure of the aflatoxins B2, B_{2a}, G_2, G_{2a}, M, and M_2 and their biochemical activity on pancreatic DNA was investigated. At concentrations lower than 80 μM, and in this order, aflatoxins B_1, B_2, and M_2 were effective activators of pancreatic deoxyribonuclease (DNase) activity. Equilibrium analysis and difference spectroscopy indicated that these toxins bind to DNA with different affinities, in order B_1 to M_2, by decreasing the Michaelis constant. The absence of the Δ^2 bond in the terminal furane ring caused an increase in the activating effect at aflatoxin concentrations higher than 80 μM in the order $B_2 > B_1 > M_2 > M_1$. Aflatoxins B_{2a}, G_{2a}, G_2, and M_1 were found to be non-competitive inhibitors of pancreatic DNase in the order given. Aflatoxin G_1 showed no definite activating or inhibiting effect on DNase activity. A hydroxy group in position 4 or 2 in the terminal furane ring determined the inhibitory (or activating) effect of these compounds. The presence of another lactone ring in aflatoxins G_1 and G_2 and its effect on DNase and their binding properties is discussed. These structural differences account for differences in the toxicity and carcinogenicity of these compounds and may be used to describe correlation between structure and function of pancreatic DNase I.

9714 MORPHOLOGIC CHANGES IN THE LIVER AFTER EXPERIMENTAL, FRACTIONATED, LOCAL X-IRRADIATION.

(Ger.) Kovács, L. (Hungarian Acad. Sci. Res. Group Med. Radiol., Budapest). *Strahlentherapie* 142(2):227-237, 1971.

In rats, during the first 15 days following the completion of local X-ray to the liver (500 r/day for 16 days), progressive necrotic and exudative changes were demonstrable, particularly in the periportal region. In the central portions of the lobes, significant inhibition of oxidative enzyme activity and both acid and alkaline phosphatase activity appeared to be independent of the presence of necrosis or exudate and was accompanied by widespread destruction of argyrophil fibers. Enzyme activity in the parenchymal cells was also sharply reduced, although it appeared to be essentially unaffected in the periportal region. Subsequent degenerative and regenerative changes both developed slowly and irregularly, over a total observation period of 150 days.

9715 INTRAPERITONEAL HALOTHANE ADMINISTRATION: EVIDENCE OF HEPATIC AND MUSCLE INJURY.

(E.) Zimmerman, H. J. (VA Hosp., Washington, D. C.), J. Kendler and R. F. Koff. *Proc. Soc. Exp. Biol. Med.* 38(2):678-682, 1971.

I.p. administration of 3.5 mmoles/kg halothane to unfasted rats led to a sharp rise in plasma levels of GOT, GPT, ornithine carbamoyl transferase, and to a slight elevation in sorbitol dehydrogenase, peak levels occurring at 30 min. Degree of rise in enzyme levels seemed proportional to doses of halothane between 1.7 and 7.0 mmoles/kg. A similar but quantitatively lesser response was observed in rats treated i.p. with ether. Pentobarbital or saline injections did not affect enzyme activity. Isoenzyme V of LDH was elevated after halothane which together with elevated GOT and GPT levels indicates skeletal muscle and hepatic injury. Halothane may have a slight and transient effect on the liver which can be translated into frank hepatic necrosis when accompanied by hypersensitivity.

9716 BILIARY DECOMPRESSION IN THE TREATMENT OF BILOTHORAX.

(E.) Williams, S. W. (Naval Hosp., St. Albans, N. Y.), P. L. Majewski, J. E. C. Norris, B. C. Cole and D. J. Doohen. *Am. J. Surg.* 122(6):829-831, 1971.

A report of a 23-yr-old man with a complicated liver injury following blunt trauma in whom decompression of the common bile duct was effective in controlling a biliary fistula. The patient was initially treated by suture repair of the liver to the diaphragm; however, because of persistent bilothorax, decompression of the biliary tract by means of T-tube choledochostomy was performed on the sixteenth day after the original procedure. The T-tube was removed 67 days after choledochostomy. A fistulous tract into the chest was never demonstrated. Subsequent chest roentgenograms showed progressive improvement and the patient was released without further complication. Biliary decompression as a means of reducing the intraductal pressure during the healing process should be considered following liver injury.

9717 HEPATITIS, ARTHRITIS AND LUPUS CELL PHENOMENA CAUSED BY METHYLDOPA.

(E.) Eliastam, M. and A. W. Holmes (Rush-Presbyterian-St. Luke's Med. Ctr., Chicago, Ill.). *Am. J. Dig. Dis.* 16(11):1014-1018, 1971.

A 40-yr-old hypertensive woman who was given methyldopa and developed hepatitis shortly therafter is reported. Her hepatitis was exacerbated when she was inadvertently given methyldopa on another occasion. On the first occasion, antinuclear antibody titer was less than 1:10, and 2 LE cell preparations were negative. Her history revealed that she knew of no potential exposures to viral hepatitis, and had no history of previous liver disease. During the exacerbation, she had transient arthritis, antinuclear antibodies and positive LE cell preparations. Thus the history and clinical and laboratory findings indicate a hepatotoxic reaction to methyldopa as the cause of this patient's problems.

9718 HEPATIC CHANGES IN DOGS AND RATS INDUCED BY XYLIDINE ISOMERS.

(E.) Magnusson, G. (AB Astra Toxicol. Lab., Sodertalje, Sweden), N. O. Bodin and E. Hansson. *Acta Pathol. Microbiol. Scand.* [A] 79(6):639-648, 1971.

9719 AFLATOXINS IN AUTOPSY SPECIMENS FROM THAI CHILDREN WITH AN ACUTE DISEASE OF UNKNOWN AETIOLOGY. (E.) Shank, R. C. (MIT Dept. Nutr. Food Sci., Cambridge, Mass.), C. H. Bourgeois, N. Keschamras and P. Chandavimol. *Food Cosmet. Toxicol.* 9(4):501-507, 1971.

9720 CULTURES OF HEPATIC TISSUE IN EXPERIMENTAL TOXICOLOGY. (Fr.) Hebert, S. (Fernand Widal Hosp., Paris), P. Gervais, F. Roux and N. Richshoffer. *Eur. J. Toxicol.* 4(3):175-198, 1971.

9721 COMBINED TRAUMA OF THE LIVER AND INFERIOR VENA CAVA. (Fr.) Gilbertas, A. (Cent. Hosp., Chambery, France), M. Blitz, P. Teissier and P. Barjhoux. *Chirurgie* 97(5):344-349, 1971.

9722 ACUTE ALCOHOLIC HEPATITIS IN CEYLON. (E.) Nagaratnam, N. (Govt. Hosp., Gampaha, Ceylon) and D. C. Peiris. *Ceylon Med. J.* 16(1):28-38, 1971.

9723 HEPATIC UPTAKE OF ORGANIC ANIONS DURING TOXIC INJURY BY DIMETHYLNITROSAMINE. (E.) Riley, S. M. (U. Alabama Sch. Med., Birmingham). *Ala. J. Med. Sci.* 8(3):264, 1971.

ACUTE VIRAL HEPATITIS

9724 MYOCARDIAL INVOLVEMENT IN INFECTIOUS HEPATITIS. (E.) Nagaratnam, N. (Govt. Hosp., Gampaha, Ceylon), D. P. K. M. De Silva and K. R. W. Gunawardene. *Postgrad. Med. J.* 47(554):785-788, 1971.

As a wide variety of infectious disease may give rise to myocarditis, the diagnosis depends often upon the recognition of the possibilities of myocarditis in the particular infection. The 4 patients in this study had jaundice and clinical and biochemical findings consistent with that of infectious hepatitis. Clinical features of myocarditis, often so variable that it is occasionally missed, were minimal in patients, limited to subtle EKG changes (nonspecific T-wave changes) in 1 case and the development of extrasystoles in the other. Features can also be glaring as the developed congestive cardiac failure with cardiac enlargement, gallop rhythm and death (case 3) or hypotension and peripheral circulatory failure (case 4). The virus may directly damage the heart tissues or give rise to a hypersensitivity or autoimmune reaction, damage usually occurring on or about the seventh to tenth day after the initial virus infection.

9725 DELAYED HTPERSENSITIVITY TO HEPATITIS-ASSOCIATED ANTIGEN IN GUINEA PIGS. (E.) Irwin, G. R., Jr., W. J. Hierholzer, Jr. and R. W. McCollum (Yale U. Sch. Med., New Haven, Conn.). *J. Infect. Dis.* 125(1):73-76, 1972.

Delayed skin reactions, manifested by induration and erythema at 24-36 hr were observed in 10 of 12 guinea pigs initially immunized with hepatitis associated antigen plus Freund's complete adjuvant, when they were subsequently (19-35 days later) challenged intradermally with the antigen alone. Positive reactions were found in animals immunized by both the i.p. and footpad routes. Histologic examination of the skin lesion revealed a moderate mononuclear cell infiltrate with the presence of some polymorphonuclear cells. Any dilution of the preparation of hepatitis-associated antigen, which contained 40 mg of protein/ml, failed to cause skin reactivity at any tested dose. Heating of the antigen for 1 min at temperatures of 37° C, 57° C, 75° C, or 98° C had little effect on results of immunization or skin tests. Sera taken before immunization and all sera drawn just before skin testing failed to react with hepatitis-associated antigen when tested by complement fixation or agar gel diffusion.

9726 HEPATITIS-ASSOCIATED ANTIGEN IN SPORADIC CASES OF ACUTE VIRAL HEPATITIS. (E.) Kelen, A. E. (Canadian Communicable Dis. Ctr. Virus Labs., Ottawa, Ontario), A. E. Hathaway, D. A. McLeod and F. P. Nagler. *Can. Med. Assoc. J.* 106(1):32-35, 1972.

The presence of hepatitis-associated antigen was detected in the blood of 63 (31%) of 204 patients and apparently healthy staff members at risk. All but 2 of the positive cases were found in the groups of 87 patients ill with acute viral hepatitis (clinically diagnosed as infectious hepatitis or serum hepatitis). The large majority of antogen-positive patients had a past history of drug addiction and sharing of syringes and needles for the past 6 months-2 yr. The group of hepatitis-associated antigen-positive drug addicts showed a higher incidence rate of antigenemia associated hepatitis among males than females. The vast majority (99%) of antigen-positive drug addicts were between 14 and 25 yr of age. The number as well as the proportion of hepatitis-associated antigen positive sera declined gradually during the third and fourth week after disease onset and only occasional positive findings were recorded at 5 or more weeks.

9727 AUSTRALIA ANTIGEN AND HEPATITIS IN ACCRA, GHANA. (E.) Morrow, R. H., Jr. (Harvard Sch. Public Health, Boston, Mass.), F. T. Sai and L. F. Barker. *Br. Med. J.* 4(5784): 389-391, 1971.

Sera from 85 patients with acute viral hepatitis in Accra, Ghana, was examined for the presence of hepatitis-associated antigen. Sera from patients early (1-7 days) in their illness were virtually all positive. No other variables (age, sex, place of birth and residence, severity of disease) were important except to the extent that they affected the opportunity for early diagnosis and admission to hospital. In males, hepatitis-associated antigen persisted parallel with the duration of jaundice but no such relationship was apparent in females. However, duration of jaundice was shorter in females. Previous epidemiologic studies in Accra indicate fecal-oral transmission rather than parenteral transmission. The high incidence of hepatitis-associated antigen-positive hepatitis in Accra, as in the general population of Africa, may be related to the high rate of cirrhosis and hepatoma in Africa.

9728 A SEX DIFFERENCE IN THE CARRIER STATE OF AUSTRALIA (HEPATITIS-ASSOCIATED) ANTIGEN. (E.) Goodman, M. (Plymouth State Home Training Sch., Northville, Mich.), R. L. Wainright, H. F. Weir and J. C. Gall, Jr. *Pediatrics* 48(6): 907-913, 1971.

A study for the distribution of Australia antigen and for the antibody to this antigen was conducted among 1077 mentally retarded residents of the Plymouth State Home, Northville, Michigan. Among children institutionalized during the first 10 yr of life, more males than females became carriers with the greatest risk among individuals with Down's syndrome. The results confirm the presence of 3 risk factors that contribute to Australia antigenemia: age at which institutionalized; duration of institutionalization; and age of the subject at the time tested. The risk was maximal for subjects institutionalized during the first 5 yr of life who have been in residence from 5 to 15 yr. A latent ability to resist the carrier state occurs with increasing age. Down's syndrome residents have a greater susceptibility to become carriers than other mentally-retarded residents. Down's syndrome females are as susceptible as males to the carrier state. Males with other forms of mental retardation are more likely to become chronic carriers as compared to females also of other forms. Mechanisms to account for these differences may involve central immune mechanisms or localized cellular enzymatic mechanism.

9729 MORPHOLOGIC CHANGES OF MOUSE LIVER AFTER INOCULATION OF ARBO VIRUS (TYPE BeAn 67949). (Ger.) Huth, F. (U. Para Inst. Reg. Pathol., Brazil) and R. de Araujo. *Virchows Arch.* [*Zellpathol.*] 9(2):153-163, 1971.

Electron microscopic examination of liver from newborn mice 6-8 days after intracerebral injection of arbovirus (type BeAn 67949), contained in suspension of brain tissue from infected mice, revealed virus particles in the nuclei of endothelial cells. These particles were in different stages of maturation with a constant diameter of 90 microns and were characterized by either double or single capsids and dense round or polar centers. In addition, different inclusion bodies varying in size between 5-200 microns were seen in the cytoplasm and nuclei of cells. Viral reduplication was accompanied by a strong proliferation of sinus-lining cells and necrosis of liver parenchyma. It is suggested that the hepatitis induced by the arbovirus differs from that obtained after inoculation of other viruses and could be used as a model for human viral hepatitis.

9730 THE HOLY CROSS COLLEGE FOOTBALL TEAM HEPATITIS OUTBREAK. (E.) Morse, L. J. (St. Vincent Hosp., Worcester, Mass.), J. A. Bryan, J. P. Hurley, J. F. Murphy, T. F. O'Brien and W. E. C. Wacker. *JAMA* 219(6):706-708, 1972.

During a 15-day period in the fall of 1969, an outbreak of infectious hepatitis, limited to the 97 member varsity football team, occurred. The attack rate was 93% as 32 patients were icteric, 22 were anicteric but symptomatic and 36 players were asymptomatic with elevated SGPT levels. Other athletes, using the same facilities but arriving 6 days after the established date of exposure were unaffected. Epidemiological studies revealed that an infected group of children on a warm August day were playing in the puddles of surface water, surrounding the field, that had been drained from the field. Due to interconnection of these water lines with the municipal water supply, a fire and the subsequent use of water created a negative pressure in the lines so as to cause back siphonage of contaminated water at the football field. Players drank this water and subsequently developed hepatitis.

9731 SEDIMENTATION CONSTANT OF HEPATITIS-ASSOCIATED ANTIGEN. BRIEF REPORT. (E.) Schober, A. (U. Gottingen Inst. Hygiene, Germany), R. Sundmacher, R. Thomssen and O. Drees. *Arch. Gesamte Virusforsch.* 35(2-3):314-316, 1971.

The buoyant density of hepatitis-associated antigen in sucrose was 1.16 g/cm^3 and in cesium chloride was 1.20 g/cm^3, similar to previously reported values. The sedimentation coefficient was no more than 40±7S as determined by trapezoidal approximation in sucrose zonal gradients using semipurified material. In order to determine the exact sedimentation coefficient and constant, several human sera containing hepatitis-associated antigen were purified by a factor of 200; the loss of antigen during purification was 98.4%. One ml of purified hepatitis-associated antigen was obtained (complement fixation titer 1:512; protein content 0.3 mg/ml). The sedimentation coefficient was 34.1S; there was no concentration dependency, since using a 1:2 dilution led to the same S value. Using this sedimentation value and a density of 1.16 g/cm^3 in Stoke's equation, the diameter of the hepatitis-associated antigen-particle becomes 19.2 mμ, which corresponds to that observed by means of electron microscopy.

9732 THE EPIDEMIOLOGY OF SERUM HEPATITIS (SH) INFECTIONS: A CONTROLLED STUDY IN TWO CLOSED INSTITUTIONS. (E.) Szmuness, W. (New York Blood Ctr., N. Y.) and A. M. Prince. *Am. J. Epidemiol.* 94(6):585-595, 1971.

Three independent samples of pairs of institutionalized mentally retarded subjects, selected by a computer program, were tested for the presence of serum hepatitis antigen. Mongols (196) had a 2.5 times higher frequency of serum hepatitis carriers than strictly matched non-mongols (point prevalence 20.4% and 7.7%, resp.). The higher prevalence in mongols apparently was related to a longer persistence of antigenemia; the chronic carrier state is probably not lifelong. Patients admitted to institutions for the mentally retarded at an early age (5 yr or less) had a 3.4-fold greater risk of becoming chronic carriers. Regardless of diagnosis, patients having the 3 most prominent risk factors (age below 20, duration of institutionalization between 10 and 19 yr and age at institutionalization below 5 yr) were found to carry the antigen 5-6 times more frequently than patients without these risk factors. A past history of overt viral hepatitis was associated with the tendency to be a chronic carrier; the chronic carrier state usually originates from anicteric infections. Serum hepatitis virus may be transmitted by nonparenteral routes.

9733 EVALUATION OF THE EFFECTIVENESS OF HEPATITIS SCREENING TESTS. (E.) Miller, W. V. (NIH, Bethesda, Md.), L. E. Watson, P. V. Holland and J. H. Walsh. *Vox. Sang.* 21(1):1-10, 1971.

Seven tests (Australia antigen, serum bilirubin, viral latex particle agglutination, SGOT, SGPT, IgG and IgM) were performed on each of 556 units of blood given to 35 patients who had open heart surgery. Six patients developed evidence of hepatitis and 11 did not. Of the 100 units given to patients who developed hepatitis, 55 came from commercial (not voluntary) donors. Only 1 unit was positive for Australia antigen determined by the Ouchterlony technique; this unit was commercial blood and was implicated in a case of recipient hepatitis. Complement-fixation test revealed the presence of 2 other Australia antigen positive units; hepatitis was associated with each of the units. The mean SGOT value, IgG and IgM value for those units transfused to recipients who subsequently developed hepatitis was higher than values for units not implicated in hepatitis. No differences were found for SGPT values. With the probable exception of Australia antigen determination none of these tests, individually or combined, are useful in excluding single donors.

9734 TRANSFUSION-ASSOCIATED HEPATITIS IN THE UNITED STATES: AN EPIDEMIOLOGIC ANALYSIS. (E.) Ratzan, K. R. (New England Ctr. Hosp., Boston, Mass.), M. B. Gregg and B. Hanson. *Am. J. Epidemiol.* 94(5):425-434, 1971.

A study of the 29,834 viral hepatitis cases (1964-1967) was submitted to the Communicable Disease Center by various State health departments. In 5.6% of these cases (1697 patients) the hepatitis was associated with 1 or more transfusions of blood and/or blood products within 2 weeks to 6 months prior to onset of symptoms. Patients were grouped according to age, incubation time, units of blood received, and period over which the blood was received. Three groups were established by incubation time (1) less than 40 days, (2) 40-59 days, (3) 60-180 days. The case fatality rate was 4% for the short incubation time, 7.7% for the 40-59 days and 9.3% for the longest incubation time. The bulk of the cases occurred in the 20-59-yr age group. Fewer persons than expected were over 60 in the short incubation group. A larger number of transfusions was associated with a longer incubation period and suggests that gamma-globulin may play a role in modifying the disease. A unimodal distribution of incubation time indicated that 1 disease, serum hepatitis, with a variable incubation time was involved. A lack of winter-spring clustering and the high case fatality ratio confirmed this.

9735 VIRAL HEPATITIS, A SECOND LOOK AND REEVALUATION IN THE LIGHT OF THE AUSTRALIA ANTIGEN. (Fr.) Bertrand, M. L. (St. Eloi Hosp., Montpellier, France). *Arch. Fr. Mal. App. Dig.* 60(8-9):393-412, 1971. (73 references)

A review includes sections on the history of the antigen, methods of demonstration, antigen-linked antibodies, variant forms of virus-induced hepatitis, and unresolved problems involving the virus, the antigen and antigen-antibody complexes.

9736 HEPATITIS AND APLASTIC ANEMIA. (E.) Bodenbender, R. H. (Moline Lutheran

Hosp., Ill.). *Am. J. Dis. Child.* 122(5):440-441, **1971**.

9737 PITFALLS OF AUSTRALIA ANTIGEN DETECTION AND SCREENING. (E.) Kohn, J. (Queen Mary's Hosp., London) and J. R. Morgan. *J. Clin. Pathol.* 24(7):673-674, 1971.

9738 HIGH PREVALENCE OF AUSTRALIA (Au) ANTIGEN CARRIERS AMONG BLOOD DONORS IN ACCRA. (E.) Foli, A. K. (U. Ghana Med. Sch., Accra) and G. Swaniker. *Ghana Med. J.* 10(3): 214-217, 1971.

9739 INCIDENCE OF HEPATITIS ASSOCIATED ANTIGEN IN A TORONTO HOSPITAL. (E.) Givan, K. F. (Women's Coll. Hosp., Toronto, Ontario, Canada) and K. Wong. *Can. Med. Assoc. J.* 105(6): 602-603, 1971.

9740 CLINICAL FORMS AND TREATMENT OF VIRAL HEPATITIS. (Fr.) Bugat, R. and J. P. Bordes. *Rev. Med. Toulouse* 7, Pt. 2(6):1025-1066, 1971.

9741 A RARE FORM OF MYOCARDITIS IN THE COURSE OF VIRAL HEPATITIS. (Pol.) Macura, M. (Milit. Hosp. 7, Katowice, Poland). *Przegl. Epidemiol.* 25(2):293-297, 1971.

9742 THE AUSTRALIA ANTIGEN AND VIRAL HEPATITIS. (Pol.) Kulesza, A. (State Inst. Epidemiol., Warsaw, Poland). *Przegl. Epidemiol.* 25(2): 205-213, 1971.

9743 VIRAL HEPATITIS IN A CLOSED INSTITUTION. I. EPIDEMIOLOGIC CHARACTERIZATION OF THE FOCUS. (Pol.) Kulesza, A. (State Inst. Epidemiol., Warsaw, Poland), M. Wroblewska Kazimierowicz and J. Wojtowicz. *Przegl. Epidemiol.* 25(2):195-204, 1971.

9744 AUSTRALIA (SH) ANTIGEN. (Ger.) Vischer, T. L. (Univ. Med. Clin., Basel, Switzerland). *Praxis* 60(37):1219-1221, 1971.

9745 LONGITUDINAL EVALUATION OF CHANGES SHOWN BY SOME ENZYMATIC ACTIVITIES IN PATIENTS SUFFERING FROM ACUTE INFECTIOUS HEPATITIS. (It.) Fiorentini, P. (Civil Hosp., Imola, Italy) and O. Cenni. *Policlinico* [*Med.*] 78(3):101-117, 1971.

9746 HEPATIC FUNCTION IN PATIENTS ON EXTRACORPOREAL PERFUSION FOR COMA COMPLICATING VIRAL HEPATITIS. BIOCHEMICAL AND COAGULATION STUDIES. (Pol.) Kassur, B. (Med. Acad. Dept. Infect. Dis., Warsaw, Poland), J. Januszkiewicz and H. Poznanska. *Pol. Arch. Mem. Wewn.* 47(1): 19-26, 1971.

9747 IMMUNOGLOBULIN PROPHYLAXIS OF INFECTIOUS HEPATITIS. (E.) Andrews, D. A. *NZ Med. J.* 73(467):199-202, 1971.

9748 BEHAVIOR OF THE SERUM CONCENTRATION OF THE C'3 COMPONENT OF COMPLEMENT IN THE COURSE OF VIRAL HEPATITIS. (It.) Bazzicalupo, G. (City Hosp., Piacenza, Italy), P. Pietranera and G. Bellodi. *Boll. Ist. Sieroter. (Milan)* 50(2):95-98, 1971.

9749 POST HEPATITIS MEDULLARY APLASIA. (Fr.) Zittoun, R. (Hotel Dieu, Paris), L. Degos and A. Kahn. *Ann. Med. Interne (Paris)* 122(5):563-574, 1971.

9750 AUSTRALIA/SH ANTIGEN AND VIRUS HEPATITIS. (Ger.) Henigst, W. (U. Munich Max Von Pettenkofer Inst. Hyg. Med. Microbiol., Germany) and B. Abar. *Munch. Med. Wochenschr.* 113(36): 1180-1184, 1971.

9751 INVESTIGATIONS ON THE PRESENCE OF AUSTRALIA ANTIGEN IN VIRAL HEPATITIS IN CHILDREN. (Rum.) Bruckner, S. (Inst. Pharm. Med., Bucharest), T. Teodorescu and D. State. *Pediatria (Bucur.)* 20(3):243-248, 1971.

9752 AUSTRALIA ANTIGEN AND VIRAL HEPATITIS OF CHILDHOOD. CLINICAL AND ETIOLOGICAL RELATIONSHIPS. (It.) Tolentino, P. (U. Genoa Infect. Dis. Clin., Italy) and A. M. Tassara. *Pediatria (Napoli)* 79(2):181-197, 1971.

9753 MANAGEMENT OF THE ASYMPTOMATIC CARRIER OF THE HEPATITIS ASSOCIATED (AUSTRALIA) ANTIGEN. TENTATIVE CONSIDERATIONS OF THE CLINICAL AND PUBLIC HEALTH ASPECTS. (E.) Chalmers, T. C. (NIH, Bethesda, Md.) and H. J. Alter. *N. Engl. J. Med.* 285(11):613-617, 1971.

9754 AUSTRALIA ANTIGEN IN SINGAPORE CHINESE PATIENTS WITH HEPATOCELLULAR CARCINOMA. (E.) Simons, M. J. (U. Singapore WHO Immunol. Res. Train. Ctr.), E. H. Yap and M. Yu. *Lancet* 1(7710):1149-1151, 1971.

9755 CHIMPANZEE ASSOCIATED INFECTIOUS HEPATITIS AMONG PERSONNEL AT AN ANIMAL HOSPITAL. (E.) Friedmann, C. T. H. (Ctr. Dis. Control, Atlanta, Ga.), M. R. Dinnes, J. F. Bernstein and G. A. Heidbreder. *J. Am. Vet. Med. Assoc.* 159(5):541-545, 1971.

9756 CHANGES IN SERUM LIPIDS IN ACUTE HEPATITIS IN CHILDREN. (Heb.) Heldenberg, D. (Univ. Med. Sch., Tel Aviv), I. Tamir and O. Levtow. *Harefuah* 80(10):538-540, 1971.

9757 SERUM HEPATITIS IN INFANTS. (Ger.) Braun, O. H. (City Hosp., Pforzheim, Germany), C. Munchenberg, W. Michalke and T. Becht. *Fortschr. Med.* 89(20-21):827-830, 1971.

9758 IDENTIFICATION OF AUSTRALIA (SH/HA) ANTIGEN IN CHRONIC LIVER DISEASE. (Ger.) Geserick, G. (Humboldt U. Inst. Forensic Med., Berlin) and P. Reckzeh. *Dtsch. Gesundheitsw.* 26(33):1562-1564, 1971.

9759 HEPATITIS ASSOCIATED (AUSTRALIA) ANTIGEN: A REVIEW. (E.) Simon, J. B. (Queen's U. Dept. Med., Kingston, Ontario, Canada). *Can. Med. Assoc. J.* 105(6):618-631, 1971.

9760 ELECTRON MICROSCOPIC DEMONSTRATION OF 'VIRUS LIKE' PARTICLES IN BLOOD PLASMA UNITS TOGETHER WITH HEPATITIS ASSOCIATED ANTIGEN (HAA). (Ger.) Apodaca, J. (Robert Koch Inst., Berlin), W. Lange and H. Kohler. *Zentralbl. Bakteriol.* [*Orig.*] 217(4):554-562, 1971.

9761 INVESTIGATIONS ON THE THERMOSTABILITY OF COMPLETE VIRUSES. (Ger.) Otte, P. (Robert Koch Inst., Berlin). *Zentralbl. Bakteriol.* [*Orig.*] 217(4):441-445, 1971.

9762 THE SOURCES OF INFECTION OF INFECTIOUS HEPATITIS. CASES NOTIFIED IN BERLIN WEST FROM OCTOBER 1, 1966 TO SEPTEMBER 30, 1967, AS RECORDED IN SOME ADMINISTRATIVE DISTRICTS. (Ger.) Hoffmann, H. G. (Robert Koch Inst., Berlin). *Zentralbl. Bakteriol.* [*Orig.*] 217(4):446-482, 1971.

9763 CARBOHYDRATE PROTEIN INDICES OF THE BLOOD SERUM IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Baran, V. M. and N. A. Iusipova. *Zdravookhr. Beloruss.* 17(6):9-12, 1971.

9764 CHANGES IN SERUM PHOSPHOLIPIDS IN CHILDREN WITH INFECTIOUS HEPATITIS. (Ger.) Lehnert, U. (Univ. Pediatr. Clin., Jena, Germany) and U. Spahn. *Z. Kinderheilkd.* 110(3):202-211, 1971.

9765 CHRONIC HEPATIC LESIONS IN ETHIOPIAN CHILDREN POSSIBLY FOLLOWING EPIDEMIC HEPATITIS. (Ger.) Zic, B. (Imp. Body Guard Hosp., Addis Abeba, Ethiopia) and K. Weithaler. *Wien. Med. Wochenschr.* 121(24):501-503, 1971.

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9767 VIRAL HEPATITIS IN YOUNG CHILDREN BASED ON A 10 YEARS STATISTICS. (Rum.) Veber, N. (Deva Hosp., Rumania), R. Botezan and C. Gramada. *Viata Med.* 18(12):539-545, 1971.

9768 FURTHER DATA ON THE RELATION BETWEEN AUSTRALIA ANTIGEN AND POST TRANSFUSIONAL VIRAL HEPATITIS. (It.) Gay, A. (Civil Hosp., Genoa, Italy). *Trasfus. Sang.* 16(2):196-200, 1971.

9769 Au ANTIGEN INCIDENCE IN THE POPULATION OF CENTRAL SOUTHERN ITALY. (It.) De Bartolo, M. (U. Rome Infect. Dis. Clin., Italy), F. Aiuti and C. Brandimarte. *Trasfus. Sang.* 16(2):163-165, 1971.

9770 BILE ACIDS IN THE BLOOD AND ELECTROCARDIOGRAPHIC FINDINGS IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Pletnev, V. M. and V. A. Postovit. *Ter. Arkh.* 43(6):54-58, 1971.

9771 DYNAMICS OF THE ARTERIAL SYSTEM IN ACUTE VIRAL HEPATITIS. (Rum.) Dimitriu, S. (Inst. Med., Iasi, Rumania), C. Iordacheanu and D. Roman. *Rev. Med. Chir. Iasi* 75(2):361-370, 1971.

9772 ATTEMPTS AT ISOLATION OF THE ETIOLOGIC AGENT OF VIRAL HEPATITIS. (Pol.) Dobrzynski, L. (PZH Inst.·Virus, Warsaw, Poland). *Postepy Hig. Med. Dosw.* 25(4):613-635, 1971.

9773 THE SYNDROME OF THICK BILE AS A SEQUEL OF INFECTIOUS JAUNDICE. (Pol.) Hroboni, T. (Med. Acad. Pediatr. Surg. Clin., Warsaw, Poland), T. Zalewski, S. Winnicki and E. Bogacka. *Pediatr. Pol.* 46(7):899-904, 1971.

9774 VARIATIONS IN ACTIVITY OF SOME ORGAN SPECIFIC BLOOD ENZYMES IN VIRAL HEPATITIS. (Rus.) Volkova, A. P. and A. M. Gerasimov. *Sov. Med.* 34(5):75-79, 1971.

9775 COMPARATIVE CHARACTERISTICS OF HEPATIC INSUFFICIENCY IN CHILDREN WITH INFECTIOUS HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Rudenskaia, I. N., V. G. Akopian, N. S. Protoklitova and A. I. Zhukovskayia. *Sov. Med.* 34(4):34-39, 1971.

9776 CHRONIC HEPATITIS AS A FIRST MANIFESTATION OF WILSON'S DISEASE. (E.)
Sternlieb, I. (Albert Einstein Coll. Med., Bronx, N. Y.) and I. H. Scheinberg. *Ann. Intern. Med.* 76(1):59-64, 1972.

A report of 7 patients (4 males, 3 females; 12-28 yr of age) with a presumed diagnosis of chronic hepatitis (for 3 months to 4.5 yr) until final diagnosis of Wilson's disease. The diagnosis of Wilson's disease was confirmed in 6 by demonstration of the Kayser-Fleischer rings and in the seventh by a serum ceruloplasmin of 1 µg/100 ml (normal, 20-40 mg/100 ml) and a hepatic copper concentration of 1531 µg/g dry liver (normal, less than 50 µg/g dry liver). All but 1 had a deficiency of serum ceruloplasmin and all had a daily urinary excretion of copper of more than 100 µg (normal, less than 50 µg/24 hr). In all 3 in whom it was measured, the hepatic concentration of copper exceeded 250 µg/g dry liver (normal, less than 50 µg/g dry liver).

9777 STUDIES OF THE AUSTRALIA ANTIGEN IN PATIENTS WITH CHRONIC HEPATITIS. (Fr.)
Buligesco, L. (Fundeni Intern. Med. Clin., Bucharest, Rumania) and N. Dumitriu. *Acta Gastroenterol. Belg.* 34(7):536-543, 1971.

The Australia antigen was demonstrable in the serum of none of 4 patients with fatty degeneration of the liver, none of 20 with persistent sequelae of chronic hepatitis, 10 of 33 with chronic hepatitis in an active stage, 3 of 6 with active, chronic hepatitis accompanied by hypergammaglobulinemia, 1 of 10 with compensated cirrhosis of the liver, 4 of 16 with uncompensated cirrhosis of the liver. The antigen was not demonstrable in 1 patient with obstructive biliary cirrhosis of the liver. Among all patients studied, it was demonstrated in the sera of 50% of the males under 20 yr of age, but only in 18.3% of all males; in the sera of 75% of the females under 20 yr of age, but only 13.3% of all females. Note is made that chronic hepatitis was of viral origin in 49 of the 59 cases reported above. As a group, the antigen-positive patients with this disorder also tended to show an increse of serum gamma globulins, with a mean level of 2.3 g% (range = 1.1-3.6 g%), as contrasted to 1.76 g% in controls.

9778 IMMUNOSUPPRESSIVE TREATMENT OF CHRONIC ACTIVE HEPATITIS. (Pol.) Wysocki, K. (Med. Acad. Inst. Intern. Dis., Poznan, Poland), K. Burchardt and H. Wysocki. *Pol. Arch. Med. Wewn.* 47(2):183-187, 1971.

9779 ^{131}I ALBUMIN TURNOVER IN CHRONIC LIVER DISEASES OF CHILDREN. (It.)
De Bernardi, B. (U. Padua Pediatr. Clin., Italy) and L. Bottacin. *Acta Paediatr. Lat.* 24(1): 40-48, 1971.

CIRRHOSIS

9780 SPIRONOLACTONE IN DIURETIC REGIMENS WITH MERALLURIDE OR THIAZIDES FOR PSEUDOINTRACTABLE ASCITES OF CIRRHOSIS. (E.)
Gold, H. (Cornell U. Med. Coll., New York, N. Y.), A. J. Golfinos, D. Mehta, C. R. Messeloff and W. Zahm. *J. Clin. Pharmacol.* 12(1):35-39, 1972.

Spironolactone was administered to 20 patients with advanced hepatic cirrhosis and ascites which did not improve when treated with a conventional diuretic regimen containing abundant meralluride or thiazide. In 15 of the 20 patients the addition of spironolactone to their regimen was followed by a resumption of or increase in diuresis and usually resulted in the complete cleaning of the ascites and edema. The responses of patients with advanced cirrhosis to spironolactone therapy were similar to those previously seen in patients with congestive heart failure. In 4 patients the response was a gain in weight and an increase in effusion. When spironolactone was administered alone, a paradoxical dominant reactive antidiuretic effect was often observed, and in spite of this effect it enhanced the diuresis from meralluride and thiazide that followed.

9781 HEPATIC BLOOD FLOW IN DOG CIRRHOSIS FOLLOWING PORTACAVAL TRANSPOSITION. (E.) Kreuzer, W. (State U. New York, Buffalo) and W. G. Schenk, Jr. *Surg. Forum* 22:349-351, 1971.

Six dogs underwent portacaval transposition after cirrhosis of the liver had been induced by the feeding of dimethylnitrosamine for 6 weeks.

Total hepatic flow and venous liver inflow were increased to almost normal levels by transposition, while the decreased hepatic artery flow caused by the cirrhosis was not influenced by the surgery. The splanchnic hypertension was reduced significantly by portacaval transposition, while adequate high liver blood flow was maintained. The clinical condition of all dogs was excellent at sacrifice 14 weeks later.

9782 SMALL INTESTINAL DISACCHARIDASE ACTIVITY IN LIVER CIRRHOSIS. (Ger.) Helms, M. (Univ. Med. Clin., Freiburg i. Br., Germany), K. Beck, W. Oehlert and K. H. Höblinger. *Acta Hepatosplenol. (Stuttg.)* 18(5):407-413, 1971.

Activity of maltase, lactase and palatinase in homogenates of intestinal mucosa obtained on biopsy from 19 patients with liver cirrhosis was not lower, while that of saccharase was higher than in normal controls (10). In 3 of 12 patients with a variety of diseases of the small intestines the saccharase activity was lower than in controls. Blood sugar levels after oral loading tests with maltose, saccharose and lactose were higher in patients with liver cirrhosis than in normal controls while several patients with other intestinal diseases (idiopathic sprue, atrophic enteritis and Whipple's disease) showed lower levels. Inflammatory changes in the mucosa were found on histologic examination in 4 of 9 patients with cirrhosis.

9783 ON THE ANEURYSMS OF A. LIENALIS IN LIVER CIRRHOSIS. (E.) Baldzijski, A. (I. P. Pavlov Med. Inst., Plovdiv, Bulgaria) and M. Mincev. *Folia Med. (Plovdiv)* 13(3):179-186, 1971.

9784 ENZYMATIC INVESTIGATIONS AND OTHER INDICES OF LIVER FUNCTION IN CIRRHOSIS. (E.) Drozdz, H. (Med. Acad. 2nd Dept. Intern. Dis., Cracow, Poland), A. Jedrychowski and M. Mysik. *Bull. Pol. Med. Sci. Hist.* 14(3):127-131, 1971.

9785 PERITONEOSCOPY AND SPOT BIOPSY FOR DIAGNOSIS OF CIRRHOSIS OF LIVER. (Rus.) Trofimov, V. M., S. A. Kalashnikov and G. V. Ryllo. *Sov. Med.* 34(5):79-82, 1971.

9786 SPECTRUM OF 'CHRONIC HEPATIC DERANGEMENT' IN NORTHERN INDIA. (E.) Gulati, P. D. (Maulana Azad Med. Coll. New Delhi, India), O. P. Bhardwaj, D. N. Gupta and H. K. Chuttani. *J. Chronic Dis.* 24(2-3):171-177, 1971.

9787 A CASE OF LIVER CIRRHOSIS WITH RENAL TUBULAR ACIDOSIS. (Fr.) Desmoulins, M. (CHU St. Antoine, Paris), P. Hadchouel and J. P. Touboul. *Ann. Med. Interne (Paris)* 122(8-9):897-902, 1971.

9788 COLLAGEN PEPTIDASE ACTIVITY OF HUMAN SERUM IN LIVER CIRRHOSIS. (Ger.) Grasedyck, K. (U. Hamburg 1st Med. Clin., Germany), D. Ropohl, F. Szarvas and J. Lindner. *Klin. Wochenschr.* 49(3):163-164, 1971.

9789 INDICATIONS FOR SHUNT OPERATION. (Ger.) Paquet, K. J. (Univ. Surg. Clin., Bonn, Germany) and E. Raschke. *Dtsch. Med. Wochenschr.* 96(30):1252-1254, 1971.

9790 STUDIES WITH RADIOACTIVE COPPER (^{64}Cu AND ^{67}Cu); THE INCORPORATION OF RADIOACTIVE COPPER INTO CAERULOPLASMIN IN WILSON'S DISEASE AND IN PRIMARY BILIARY CIRRHOSIS. (E.) Gibbs, K. (U. Cambridge Dept. Invest. Med., England) and J. M. Walshe. *Clin. Sci.* 41(3):189-202, 1971.

9791 FLUCTUATIONS OF PORTAL PRESSURE UNDER NORMAL CONDITIONS AND APPRECIATION OF THE SEVERITY OF PORTAL HYPERTENSION IN LIVER CIRRHOSIS. (Rus.) Mansurov, K. K. *Ter. Arkh.* 43(6):65-69, 1971.

9792 HYDROTHORAX IN HEPATIC CIRRHOSIS. (Sp.) Rubies Prat, J. (Sch. Intern. Med., Barcelona, Spain), R. Bacardi Noguera and M. Soler Obradors. *Med. Clin. (Barc.)* 57(1):85-92, 1971.

See also numbers: 9168, 9414, 9775

9793 CHOLANGIOGRAPHIC APPEARANCE OF PRIMARY CARCINOMA OF THE BILE DUCTS. (E.)
Legge, D. A. (Mayo Grad. Sch. Med., Rochester, Minn.) and H. C. Carlson. *Radiology* 102(2): 259-266, 1972.

Thirty-two cases of primary carcinoma of the bile ducts with technically satisfactory cholangiograms are reviewed retrospectively. These studies were made by percutaneous transhepatic injection, or by operative or postoperative injection of contrast medium into a T-tube in the bile ducts. Ampullary tumors and tumors with questionable sites of origin were excluded. Abnormalities were noted in all 32. The lesions were in the common bile duct in 11, near the porta Hepatis in 20 and at both sites in 1. In those with common duct lesions, there was abrupt occlusion of the common duct with associated dilatation of both intrahepatic and extrahepatic ducts proximal to the site of occlusion in 7, while in the other 4 the occlusion was abrupt but smooth in appearance. In lesions near the porta hepatis (involving right, left and common hepatic ducts as well as adjacent tissues) the appearance on cholangiography varied from narrowing of the common hepatic duct and its proximal branches to total occlusion. Each of the 32 presented with obstructive jaundice, while only 10 complained of abdominal pain, but its presence or absence did not correlate with cholangiographic findings. One or more exploratory laparotomies were performed on 13 of the 32 (5 with common duct, 8 with porta hepatis lesions) before the correct diagnosis was made.

9794 DIAGNOSIS OF CHOLEDOCHOLITHIASIS BY BARIUM DUODENAL EXAMINATION. (E.)
Eaton, S. B., Jr. (Massachusetts Gen. Hosp., Boston), J. T. Ferrucci, Jr., K. T. Benedict, Jr. and A. F. Margulis. *Radiology* 102(2):267-273, 1972.

The authors studied 17 patients in whom the roentgen signs of choledocholithiasis were demonstrated preoperatively by conventional upper gastrointestinal barium examination and/or hypotonic duodenography. A single case is presented of a 74-yr-old woman who presented with a one-month history of increasing intermittent epigastric discomfort which radiated to the right shoulder and was aggravated by fatty foods. Oral cholecystography failed to opacify the gallbladder, and hypotonic duodenography revealed a smoothly rounded indentation defect on the inner duodenal border, interpreted as edema of the duodenal papilla secondary to an impacted ampullary gallstone. Surgery revealed cholelithiasis and a 14 mm gallstone was found in the distal common bile duct. The roentgen findings in choledocholithiasis are reviewed, with special attention to the papilla in its normal and edematous state. The papillae had a mean size of 2.4 mm in the 17 and was rounded or semilunar in 65% and its surface was perfectly smooth in 70.5%. Other diagnoses in the roentgenologic differential included periampullary carcinoma, papillary edema unrelated to choledocholithiasis, benign tumors and a normal large papilla. A set of clinical criteria are presented to aid in the clinical differentiation of choledocholithiasis from periampullary tumors and pancreatitis.

9795 THE DEVELOPMENT OF GALLSTONES. (E.)
Womack, N. A. (U. North Carolina Sch. Med., Chapel Hill). *Surg. Gynecol. Obstet.* 133(6):937-945, 1971.

This study in syrian hamsters noted the essential formation of mucus prior to cholesterol gallstone formation and postulates that the phenomena of crystal growth may be a factor in human gallstone development. Male and female hamsters were fed a lithogenic diet and the gallbladders of these animals were studied in various periods of stone formation. Grossly apparent stones began to appear within from 2-3 weeks and by 6 weeks over 50% of the lithogenic hamsters were identified. The first change noted, commonly at the end of the second week, was the formation of a viscid mucus. Polarized light identified cholesterol crystals becoming enmeshed in the mucus and was interior in location. An easily bent soft stone that advanced to a hard stone was then noted. Whether the mucus differed in various stages could not be determined, although such factors as pore size, the presence of organic molecules and pH were considered. Contamination of the mucus with other proteinaceous material resulted in bilirubin and calcium mixing.

9796 STUDIES OF PRESSURE AND BILE FLOW, FOLLOWING SPHINCTEROTOMY. (Fr.)
Salembier, Y. (Place de Tourcoing 27, Lille, France). *Acta Gastroenterol. Belg.* 34(7):544-549, 1971.

Among 12 patients undergoing sphincterotomy for choledocholithiasis, incisions were limited to 15-20 mm, or just sufficient to permit introduction of an instrument to grasp the calculi. When tested, 2 weeks after surgery, the ability of injected morphine to contract the sphincter of Oddi was completely normal, as was the ability of inhaled amyl nitrate to dilate it. As confirmed by the changes induced in both volume of bile flow and pressure, there were no significant deviations from normal response to either agent.

9797 PERCUTANEOUS, TRANSHEPATIC CHOLANGIOGRAPHY. FORTY CASES. (Fr.) Fékété, F. (Beaujon Hosp., Clichy, France), H. Nahum, P. De Lagausie and C. Moine. *Arch. Fr. Mal. App. Dig.* 60(8-9):433-444, 1971.

Cholangiography by means of percutaneous puncture of the bile ducts, executed under local anesthesia on the morning of the day on which surgical intervention was scheduled, specifically confirmed the site of blockage or diversion in 35 of 40 jaundiced patients, including 13 with cancers of the head of the pancreas, 8 with postoperative retention of bile, 7 with cancers of the extrahepatic bile ducts, 4 with pathology of the ampulla of Vater and 3 with choledocholithiasis. It is concluded that the technique is particularly valuable when re-intervention is being considered under conditions which make conventional, preoperative X-ray studies difficult or impossible.

9798 AN EVALUATION OF MANOMETRIC OPERATIVE CHOLANGIOGRAPHY IN 100 PATIENTS WITH BILIARY DISEASE. (E.) Hopton, D. (Univ. Hosp., Seattle, Wash.) and T. T. White. *Surg. Gynecol. Obstet.* 133(6):949-954, 1971.

Manometric cholangiography was performed on 100 patients who underwent operations on the biliary tract. The investigation combined both the pressure study and roentgenographic assessment of the duct. The study was technically impossible or invalid in 12 patients due to the diameter of the cystic duct, obstruction of the canula, or administration of morphine during the procedure. Normal bile duct pressure of 16 cm or less was correlated with a normal duct in 57 patients. Abnormally high bile duct pressure was associated with abnormal ducts in all but 7 of the remaining patients (8%). The combined evidence from pressure and radiologic studies gave an accurate diagnosis of a pathological condition in 98% of the patients. Pressure studies are most useful in the detection of small stone and in the diagnosis of organic changes in the sphincter of Oddi. The method required 7 additional minutes of operating time but less elaborate techniques are being evaluated. Manometry is of particular value in secondary operations and the presence of stones in the other parts of the biliary tree does not elevate pressure.

9799 GARDNER'S SYNDROME ASSOCIATED WITH MALIGNANT DEGENERATION OF A POLYP OF THE SPHINCTER OF ODDI. (Fr.) Stalport, J. (Chaussee de Liege 35, Huy, Belgium) and P. Letawe. *Acta Gastroenterol. Belg.* 34(8-9):644-651, 1971.

In a 23-yr-old woman presenting with extensive, diffuse polyposis of the colon and rectum, biopsy samples suggested possible malignancy. Seventeen yr after total colectomy, dictated by this consideration, she presented again, with obstructive jaundice, chronic cholecystitis, cholelithiasis and a glandular-carcinomatous polyp of the Sphincter of Oddi which blocked the papillary orifice completely, resulting in stenosis of both the common bile duct and Wirsung's canal. Surgical intervention included excision of the polyp, cholecystectomy, and re-anastomosis of the choledochus and Wirsung's canal inside the duodenum. At the time of this second intervention, the patient had developed 2 cranial osteomas, 1 in each parietal region.

9800 EPIDEMIOLOGICAL ASPECTS OF GALLBLADDER AND BILIARY TRACT NEOPLASM. (E.) Hart, J. (Tel Hashomer Govt. Hosp., Tel Aviv), M. Shani and B. Modan. *Am. J. Public Health* 62(1): 36-39, 1972.

Cases (390) of biliary tract and gallbladder cancer diagnosed in Israel between 1960 and 1965 are reviewed. Tumor of the gallbladder was suspected in less than 2% of the males and in 14% of females. Over 50% of the cases were 65 yr and over at diagnosis; the male-female ratio was 1:5 and was present in all age groups. Incidence was higher in European-born females as compared to Asian- and African-born, while no such difference existed among males. Presence of stones was found in 69% of the males and 83% of the females with gallbladder cancer, as compared to 20 and 60%, resp., in biliary tract tumors. Since at least 50% of patients with gallbladder cancer had history of biliary disease for at least 5 yr prior to diagnosis of gallbladder cancer, cholelithiasis apparently predisposes to gallbladder cancer and not vice versa.

9801 THE EFFECT OF CLOFIBRATE ON SERUM AND FAECAL LIPIDS. (E.) Mitchell, W. D. (Western Gen. Hosp., Edinburgh, Scotland) and L. E. Murchison. *Clin. Chim. Acta* 36(1):153-161, 1972.

Estimations of serum cholesterol and triglyceride, fecal fat, fecal neutral steroids, and fecal bile acids were determined in 21 patients before and during treatment with clofibrate. The decrease in serum lipids following treatment was associated with decreased fecal bile acid output. No significant alteration of fecal neutral steroid or fecal fat excretion occurred during therapy. The reduction of serum cholesterol during treatment seemed to be due to decreased synthesis of cholesterol. The greatest reduction of serum cholesterol levels occurred in those with the highest pretreatment levels and was noted in the female subjects. The subjects received clofibrate for 9-15 days; they were divided into 2 groups on the basis of having received 1 or 2 g/day. Ten subjects were readmitted for further collection of feces (from 1-9 months) after continued clofibrate therapy. Significant reduction of serum cholesterol had been maintained in 7 of 10. The mean increase for the group was not statistically significant.

9802 FECAL EXCRETION OF ROSE BENGAL I^{131} IN THE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE IN INFANCY WITH SPECIAL REFERENCE TO BILIARY ATRESIA. (E.) Maksoud, J. G. (U. Sao Paulo Sch.

Med., Brazil), A. F. Thom, J. Kieffer and V. A. Carvalho Pinto. *Pediatrics* 48(6):966-969, 1971.

The clinical picture of neonatal jaundice in neonatal hepatitis and in atresia of the extrahepatic bile ducts is often atypical and clinical diagnosis is difficult. A low percentage fecal excretion of Rose Bengal ^{131}I is indicative of biliary atresia. This study of 27 children establishes definite values for such fecal excretion by establishing consistent technical procedures. Only stool sample gave a reliable measurement of the radioisotope. Two drops of Lugol's solution, 3 days prior to the test, blocked I^{131} uptake by the thyroid. The stool samples were collected in special plastic bags over a 48-hr period. A reference standard equal to the amount of labeled dye that the child received was prepared. The results of the test were a mean value of 49% of the dose (range 221-71.5%) for the 5 controls, a mean value of 13.2% of the dose (range 6.9-22.0%) for the 7 children with non-atresic jaundice, and a mean value of 3.36% of the dose (range 0.6 to 6.6%) for the 17 children with biliary atresia. An upper limit of 5.8% for the atresia group and a lower limit of 6.1% for the hepatitis group was established and did not invalidate the practical value of the test.

9803 SPONTANEOUS INTERNAL BILIARY FISTULA, OBSTRUCTIVE AND NONOBSTRUCTIVE TYPES: TWENTY-YEAR REVIEW OF 55 CASES.

(E.) Piedad, O. H. (State U. New York Dept. Surg., Buffalo) and P. B. Wels. *Ann. Surg.* 175(1):75-80, 1972.

There was improvement in the preoperative diagnosis in both obstructive and nonobstructive types of spontaneous internal biliary fistula in the 20-yr period studied (from 23% to 56%). In the nonobstructive type the diagnostic accuracy was only 19% as compared to 63% in gallstone ileus, emphasizing the difficulty of diagnosis in the former type. Forty-four patients had previously diagnosed associated disease, 25 of which were arteriosclerotic cardiovascular disease; followed by pulmonary disease and diabetes. Of 55 cases, 53 were caused by chronic cholecystitis with cholelithiasis; the most common (70%) communication being cholecystoduodenal. Mortality and morbidity in the nonobstructive type may be reduced by better understanding of anatomical distortions, leading to refinements in operative technique. Earlier diagnosis and surgical treatment of gallstone ileus will improve death rates in the obstructive type.

9804 BILE FLOW AND ENLARGEMENT OF THE GALLBLADDER IN EXPERIMENTAL CHOLELITHIASIS.

(E.) Hall, R. C. (Upstate Med. Ctr., Syracuse, N. Y.), J. T. Crosby and J. Tepperman. *Surg. Forum* 22:384-386, 1971.

Significant increases in bile flow and enlarged gallbladders were induced in mice fed 1.0% cholesterol and 0.5% cholic acid, in hamsters fed a high glucose, fat-free diet and in rabbits fed sugar, starch and olive oil. These results support the hypothesis that there is a mechanistic relationship between gallbladder distention and selective bile acid absorption. Bile acid absorption could decrease solubilization of cholesterol and allow it to precipitate.

9805 MUCUS PRODUCTION IN GALLSTONE FORMATION - AUTORADIOGRAPHS USING TRITIATED GALACTOSE.

(E.) Ely, J. W. (Upstate Med. Ctr., Syracuse, N. Y.), R. C. Hall and J. Tepperman. *Surg. Forum* 22:383-384, 1971.

Mice fed a lithogenic diet (1% cholesterol and 0.5% cholic acid) for 40 days and control mice were sacrificed 15 min after an injection of ^{3}H-galactose. In the gallbladder tissue of all animals, radioactivity was found concentrated in the supranuclear Golgi region and in the apical secretory portion of the mucosal cells. Although grain counts/cell did not increase in the lithogenic diet group, the number of gallbladder mucosal cells was more than double that of the controls. Results indicate that the increased mucus observed in the gallbladder of mice fed a lithogenic diet is due to hyperplasia of the mucosa, rather than to increased glycoprotein production of each cell.

9806 CHOLECYSTOKININ CHOLECYSTOGRAM IN THE DIAGNOSIS OF THE CYSTIC DUCT SYNDROME.

(E.) Páride Conte, V. (Clin. Hosp., Sao Paulo, Brazil), H. W. Pinotti, T. de Brito and J. F. Pontes. *Am. J. Dig. Dis.* 16(11):971-975, 1971.

Cholecystokinin cholecystograms were performed in 8 patients with symptoms suggestive of cystic duct syndrome to evaluate their usefulness as a diagnostic tool. The cholecystokinin cholecystograms revealed no decrease in gallbladder volumes in 3 patients, and clearly impaired contraction in 4. Cholecystokinin biliary drainage produced no bile flow in 1 patient and scanty flow in another; dark gallbladder bile did not appear in 2 patients. In 4 patients pain was experienced during the test, and abnormal gallbladder pressure values were noted in 6 patients. Surgical findings suggested the diagnosis of cystic syndrome in 7 patients, all of whom showed abnormal features on their cholecystograms. This diagnostic procedure seems to be of great value in determining a partial, noncalculous, obstruction of the cystic duct.

9807 ASSOCIATION OF CYSTIC DILATATION OF INTRAHEPATIC AND COMMON BILE DUCTS WITH LAURENCE-MOON-BIEDL-BARDET SYNDROME.

(E.) Meeder, W. R., Jr. (U. Kentucky Coll. Med., Lexington) and E. J. Nighbert. *Am. J. Surg.* 122(6):822-824, 1971.

A 28-yr-old female patient with cystic dilatation of the intrahepatic and common bile ducts and the Laurence-Moon-Biedl-Bardet syndrome is presented. The patient showed only 3 of the 5 main features of the syndrome; that is, retinitis pigmentosa, polydactyly, and obesity, lacking genital hypoplasia and mental retardation. Following exploration, a T-tube was inserted into the common bile duct and cholangiograms were taken 11 and 21 days after surgery. Very little contrast medium passed into the duodenum from a greatly dilated common duct and intrahepatic biliary tree. Twenty-six days after exploration the distal common duct was oversewn and the dilated proximal portion was anastomosed end-to-side to a Roux-en-Y loop of jejunum. This case may provide support for the congenital etiology of cystic dilatation of the biliary tree because of its coexistence with a condition thought to represent an autosomal recessive hereditary disturbance caused by a mutation of 2 genes within 1 chromosome.

9808 CARCINOMA ARISING IN A CHOLEDOCHAL CYST. (E.) Weber, B. B., F. J. Soler, R. G. Font and F. C. Nance (Louisiana State U. Med. Ctr., New Orleans). *Am. J. Dig. Dis.* 16(11): 1019-1025, 1971.

A patient with a carcinoma arising in the posterior wall of a choledochal cyst is reported and 6 previously reported cases are reviewed. In this patient, a 49-yr-old male, an upper gastrointestinal series revealed an indentation on the superior border of the duodenum and liver function studies were normal except for an elevated alkaline phosphatase and a BSP retention of 38.5%. Single- and double-dose oral cholecystograms failed to visualize the gallbladder, and an abnormal liver scan was consistent with large hilar nodes and/or a lesion invading the liver from the lesser sac. A celiac angiogram revealed a large mass in the right upper quadrant which was cystic in nature with no neovascularization suggestive of tumor. At laparotomy, a large hard tumor mass was found along the posterior wall of the cyst which lay just below the cystic duct entrance into the common duct, and invasion into the portal vein was noted. Two metastatic nodes on the anterior surface of the liver were also seen. Due to the location of the tumor and the metastasis, resection was not undertaken and the patient died 6 months later.

9809 A CASE OF INTRAHEPATIC COMMUNICATION BETWEEN AN ECTOPIC RIGHT HEPATIC DUCT AND THE NORMAL RIGHT HEPATIC DUCT. (Fr.) Pedinielli, L. (Cent. Hosp., Toulon, France), J. Martin, D. Ranivoalison and D. Futsch. *Sem. Hop. Paris* 47(23):1521-1525, 1971.

9810 THE SO-CALLED DEFERRED CHOLECYSTECTOMY. (Sl.) Kostelecky, A. (Natl. Health. Inst., Ceske Budejovice, Czechoslovakia) and J. Trnovec. *Rozhl. Chir.* 50(5):277-281, 1971.

9811 BILIARY TRACT CHANGES IN OPISTHORCHIASIS. (E.) Evans, H. (SEATO Med. Project, Bangkok, Thailand), C. H. Bourgeois, D. S. Comer and N. Keschamras. *Am. J. Trop. Med. Hyg.* 20(5): 667-671, 1971.

9812 SPHINCTEROTOMY IN BILIARY SURGERY. (Ger.) Roux, M. M. (Sch. Med., Paris). *Actuelle Chir.* 6(3):169-176, 1971.

9813 BILE PERITONITIS AFTER T TUBE REMOVAL. (E.) Osborne, J. C. (Lion's Gate Hosp., North Vancouver, British Columbia, Canada). *Can. J. Surg.* 14(4):241-242, 1971.

9814 MANAGEMENT OF MALIGNANT OCCLUSIONS OF THE BILE DUCTS. (Ger.) Muller, T. (Univ. Surg. Clin. Rostock, Germany). *Zentralbl. Chir.* 96(27):908-918, 1971.

9815 SPONTANEOUS PERFORATION OF ECTOPIC BILE DUCTS IN THE TRIANGULAR LIGAMENT OF THE LIVER. (Ger.) Waldschmidt, J. (Steglitz Clin., Berlin), R. Haring and S. John. *Zentralbl. Chir.* 96(27):902-907, 1971.

9816 AMPHETAMINE INGESTION WITH BILIARY ATRESIA. (E.) Levin, J. N. (Child. Memorial Hosp., Chicago, Ill.). *J. Pediatr.* 79(1):130-131, 1971.

9817 INFECTIVE COMPLICATIONS OF CHOLEDOCHOTOMY WITH T-TUBE DRAINAGE. (E.) Keighley, M. R. B. (Roy. Infirm., Huddersfield, England) and N. G. Graham. *Br. J. Surg.* 58(10):764-768, 1971.

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9832 PEER REVIEW IN BILIARY TRACT SURGERY. (E.) Derouville, W. H. (New York State Dept. Health, Albany). *NY State J. Med.* 71(12): 1544-1548, 1971.

9833 GALLBLADDER AND BILIARY TRACT DISEASES IN ZAMBIANS. (E.) Desai, M. H. (Cent. Hosp., Kitwe, Zambia) and K. Khurana. *Med. J. Zambia* 5(4):121-125, 1971.

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9837 AMYLOLYTIC ACTIVITY IN GALLBLADDER BILE IN CHOLECYSTITIS ASSOCIATED WITH ACUTE PANCREATITIS. (Sp.) Ribera, M. T. (Santa Cruz San Pablo, Hosp., Barcelona, Spain), L. Gramatica and M. Roca. *Barcelona Quir.* 15(2): 123-124, 1971.

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9839 A METHOD OF EVALUATION OF THE INFLUENCE OF ASPIRIN FORMULATIONS ON GASTROINTESTINAL MICROBLEEDING IN HUMANS. (E.) Phillips, B. M. (Miles Labs. Inc., Elkhart, Ind.), P. J. Kraus, J. L. Allen and R. M. Buslee. *Toxicol. Appl. Pharmacol.* 20(4):515-521, 1971.

An efficient incomplete cross-over design was used to evaluate 4 prototype aspirin formulations, 2 reference formulations, and a placebo in 21 adult male volunteers. Mean daily fecal blood loss values were calculated for the 7 formulations. While there were significant differences between groups and among people within groups, there was no significant difference between treatment periods, and there was no trend in fecal blood loss with time. Significant differences between both the direct and residual effects of the various treatments were observed; however, the residual effects of the various formulations generally correlated well with the direct effects. Of the 6 aspirin-containing formulations, only ordinary aspirin tablets elicited significantly greater blood loss than the placebo. Blood loss values significantly lower than that seen with the ordinary aspirin tablet and not significantly different from that seen with the placebo were observed during treatment with an effervescent formulation and with 1 of the experimental formulations. The data suggest that treatment with aspirin may influence the fecal blood loss observed during the next period of treatment with a different formulation, the 2 periods being separated by 5 days of no treatment.

9840 THE EFFECT OF INTESTINAL TRANSIT TIME, STUDIED BY CHROME-CARMINE, ON THE COMPOSITION OF STOOLS. (Fr.) Smadja, M. (St. Lazare Hosp., Paris) and J. J. Bernier. *Arch. Fr. Mal. App. Dig.* 60(10-11):497-506, 1971.

In a series of studies with ^{51}chrome-labeled carmine, no correlation could be demonstrated between the speed of intestinal transit and the concentration of either water or electrolytes in the stools of 14 patients with diarrhea due to primary hypermotility or 8 with diarrhea which was secondary to intestinal hypersecretion and not accompanied by accelerated transit. Among 10 patients with diarrhea secondary to malabsorption syndrome at the level of the small intestine, sharply accelerated transit, especially through the colon, appeared to be due to ileal malabsorption of bile salts and their consequent laxative effect at the colonic level. Again, the concentration of water and electrolytes remained unaffected. In all of these patients, as in 5 constipated and 5 nonconstipated controls, a highly significant, positive correlation was demonstrated between intestinal transit time and the total weight of the stools, expressed as grams per 24 hours.

9841 BILE ACIDS, BACTERIA AND STEATORRHEA. (Ger.) Egger, G. (Univ. Med. Clin., Bern, Switzerland). *Dtsch. Z. Verdau Stoffwechselkr.* 31(1):1-9, 1971.

A test is described which uses a millipore filter to permit isolation of bacteria from the patient's small intestine, in vitro demonstration of deconjugation and/or dehydroxylation of the patient's bile acids by such bacteria, a comparison of in vitro and in vivo deconjugation activity (thus diminishing the number of false-negative chromatographic findings) and an objective, pretreatment evaluation of proposed antibiotic therapy. Among 35 patients in whom the test was used experimentally, deconjugation of bile acids was demonstrated in 30% of patients with chronic diarrhea, but 6.6% of those without diarrhea. A comparison of test results with those of conventional studies yielded 27 negative findings for both, 7 cases in which both were positive, 1 in which the test was positive but conventional techniques were negative, none in which conventional techniques were negative, none in which conventional techniques yielded positive findings while the new test did not.

9842 SALMONELLA ENTERITIS. I. ROLE OF REDUCED GASTRIC SECRETION IN PATHOGENESIS. (E.) Giannella, R. A., S. A. Broitman and N. Zamcheck (Boston City Hosp., Mass.). *Am. J. Dig. Dis.* 16(11):1000-1006, 1971.

Three patients with cholera-like diarrhea with reduced gastric acid secretion and 4 patients with mild diarrhea with normal gastric acid secretion, all of whom had salmonella enteritis are reported. The 3 patients with severe diarrhea had achlorhydria, or marked hypochlorhydria, abnormally high basal gastric pH and markedly reduced intrinsic factor secretion. In contrast, all those with mild diarrhea had normal basal acid output, low basal gastric pH values, and normal or near-normal intrinsic factor secretion. Gastric biopsies taken in the immediate convalescent period demonstrated either atrophic gastritis or gastric atrophy in the 3 patients with severe diarrhea. The data suggest that patients with reduced gastric acid secretion may have more severe enteritis due to inability to reduce the number of ingested bacteria which pass into the intestine.

9843 DISINFECTION OF THE UMBILICUS FOR ABDOMINAL SURGERY. (E.) Sellers, J. (United Bristol Hosp., England) and J. H. Newman. *Lancet* 2(7737):1276-1278, 1971.

Bacterial swabs taken from the umbilicus and the abdominal skin were cultured, before and after applying disinfectant. The same types of organism were found in the umbilicus as on the skin, but in much greater numbers. The commonest were Staphylococcus albus, diphtheroid bacillus, and gram-negative bacilli. Disinfection with chlorhexidine in 70% alcohol gave satisfactory results for the skin, but poor results with the umbilicus. Only 36% gave no growths from umbilical swabs, and moderate or heavy growths were obtained from 13%, twenty min after cleansing. The proportion of sterile umbilical swabs rose from 36-70% when a small pledget of sterile cotton wool, soaked in povidone iodine, was left in the umbilicus for 1 hr before treating with chlorhexidine in 70% alcohol. It is important to cleanse the umbilicus thoroughly before applying any disinfectant to it, so as to remove squamous debris which may protect bacteria.

9844 SALMONELLA ENTERITIS. II. FULMINANT DIARRHEA IN AND EFFECTS ON THE SMALL INTESTINE. (E.) Giannella, R. A., S. A. Broitman and N. Zamcheck (Boston City Hosp., Mass.). *Am. J. Dig. Dis.* 16(11):1007-1013, 1971.

Seven patients with Salmonella enteritis were studied during the course of and after acute infection, and the volume of their diarrhea was measured. Four patients had mild diarrhea of less than 7 days' duration with fecal outputs less than 1.0 liter/day, while 3 patients had severe diarrhea for 7-14 days, with fecal volume in excess of 3.0 liters/day. For the patients with severe diarrhea, fecal fluid output reached a peak of 10.3 liters on the eighth hospital day, with fecal Na^+ and K^+ concentrations of 91 and 13 mEq/liter, resp. In all patients, serum prothrombin time, cholesterol, folic acid, iron and carotene levels were normal. In all but one patient absorption of fat, glucose, and xylose was normal, however, 2 patients showed malabsorption of vitamin B_{12}. Jejunal biopsies, taken immediately after the acute illness, were normal in each patient. The 3 patients with severe diarrhea and 1 with mild diarrhea had evidence of jejunal bacterial overgrowth. Thus, differences in the composition and duration of diarrhea may be useful in differentiating beteeen cholera and Salmonella enteritis.

9845 EFFECT OF SMALL INTESTINAL BACTERIA ON INTRINSIC FACTOR AND THE VITAMIN B_{12}-INTRINSIC FACTOR COMPLEX. (E.) Schjönsby, H. (Roy. Postgrad. Med. Sch., London) and S. Tabaqchali. *Scand. J. Gastroenterol.* 6(8):707-713, 1971.

The effect of small intestinal bacteria isolated from stagnant loop patients on human intrinsic factor and the bond between the vitamin B_{12}-human intrinsic factor complex was studied in vitro. A moderate reduction of intrinsic factor concentration was observed after incubation with E. coli, Klebsiella, and bacterioides, while the reduction in intrinsic factor concentration was minimal after incubation in sterile medium. The ability of human gastric juice to enhance the uptake of $^{57}CoB_{12}$ by guinea pig small intestinal brush borders was unaffected by enterobacteria or bacteroides, but was decreased significantly (79% of control) by incubation with bifidobacteria. Dialysis of human gastric juice-bound $^{57}CoB_{12}$ with bacterial cultures did not result in a significant release of unbound $^{57}CoB_{12}$. Bacterial cell extracts from these cultures contained partially bound $^{57}CoB_{12}$. The uptake of the radioactivity in the extracts and of human gastric juice-bound $^{57}CoB_{12}$ by guinea pig ileal brush borders was markedly higher than the uptake of unbound $^{57}CoB_{12}$. The data suggest that intestinal bacteria do not cause vitamin B_{12} malabsorption in the stagnant loop syndrome by reducing intrinsic factor activity or by releasing vitamin B_{12} from its bond to intrinsic factor.

9846 MAGNETIC TUBE FOR REMOVAL OF FERROUS FOREIGN BODIES FROM STOMACH AND DUODENUM IN CHILDREN. (E.) Fišer, B. (Charles U. Pediatr. Surg. Clin., Prague). *Lancet* 1(7741):76-77, 1972.

For removal of ferrous foreign bodies from the stomach and duodenum of children, the author describes a device consisting of a double gastric tube with an Alnico magnet at the tip of the inner tube. Fluoroscopic positioning of this device is facilitated when the end of the outer tube is made radioopaque. Premedication of the patient is seldom required. Once the magnetic tip is in contact with the foreign body, this object is pulled into the lumen between the inner and outer tube and both tubes are removed without damage to the upper gastrointestinal tract.

9847 BIOASSAY AND RADIOIMMUNOASSAY OF PLASMA GASTRIN IN A CASE OF ZOLLINGER-ELLISON SYNDROME. (E.) Temperley, J. M. (Univ. Coll. Hosp. Med. Sch., London) and B. H. Stagg. *Scand. J. Gastroenterol.* 6(8):735-738, 1971.

Fasting plasma gastrin levels were measured in a patient with the Zollinger-Ellison syndrome and hyperparathyroidism using a bioassay and radioimmunoassay and the results were compared. Whereas plasma gastrin levels were not altered by total gastrectomy and excision of the tail of the pancreas which contained the islet cell adenoma, hyperparathyroidectomy was followed by a marked fall in plasma gastrin. This trend was observed with both assay methods; however, bioassay results were consistently 2-3 times higher than those with radioimmunoassay. Assays of tissue gastrin yielded almost identical results with both methods when specimens were taken from the antral mucosa and from the pancreatic tumor. Biologically active gastrin-like substances which cannot be detected by radioimmunoassay may been present in the patient's plasma.

9848 SERIAL RADIOIMMUNOLOGIC ASSAYS OF SERUM GASTRIN IN A PATIENT WITH ZOLLINGER-ELLISON SYNDROME. (Fr.) Croisier, J.-C. (CHU Pitie Salpetriere, Paris), M. Huguier and G. Croisier. *Arch. Fr. Mal. App. Dig.* 60(10-11): 559-568, 1971.

A 59-yr-old man with 1 perforated and 1 non-perforated ulcer of the first jejunal loop underwent resection of the loop and jejunojejunal anastomosis, 2 months prior to total gastrectomy for recurrence and left pancreatectomy in the presence of 2 ulcerogenic adenomas of the islands of Langerhans. Both tumors appeared to be benign and neither had been visible or palpable at the time of the first intervention. Prior to the second intervention, diagnosis of Zollinger-Ellison syndrome had been suggested by the fasting level of serum gastrin in the peripheral circulation, which had reached 3333 picograms per ml serum, as contrasted to a normal value of less than 100. Intraoperative determinations in samples from the splenic, pancreatic-duodenal and portal veins, and from a peripheral vein in the arm, ranged from 113-180 picograms per ml serum. Postoperative samples were destroyed accidentally before determinations could be made.

9849 QUANTITATIVE STUDIES OF TOXIN IN THE STOOLS AND JEJUNAL ASPIRATES OF PATIENTS WITH CHOLERA. (E.) Aziz, K. M. S. (Pakistan-SEATO Cholera Res. Lab., Dacca) and W. H. Mosley. *J. Infect. Dis.* 125(1):36-44, 1972.

Sterilized filtrates of choleraic stools and jejunal aspirates were stored at 40-50°C and assayed for potency in the back skin of adult rabbits and for fluid-producing activity in ligated intestinal loops. Toxins prepared in vitro were also assayed by the same techniques. Most of the choleraic stools showed detectable toxic activity; however, the toxin titers were generally low. These stools showed the same relative activity in the assays as that observed for toxins produced in vitro, lending support to the hypothesis that the same toxin is involved in both reactions. Unexpectedly, toxin was undetectable in the majority of jejunal aspirates, even when significant titers were present in stools collected simultaneously.

9850 POST-VAGOTOMY ABDOMINAL CHYLOUS FISTULA. (E.) Musgrove, J. E. (Vancouver, British Columbia, Canada). *Ann. Surg.* 175(1): 67-69, 1972.

A chylous fistula was produced in a 40-yr-old woman during an abdominal truncal vagotomy by division of an aberrant lacteal, probably the gastrointestinal trunk. In 1 day, 2250 ml of chyme was drained; there were excessive losses of protein (3.3 gm/100 ml), fat (2.61/gm/100 ml) and vitamin K, that were controlled by lacteal ligation. When a large lymphatic vessel is observed during operation in the proximity of cysterna chyli or when a chylous fistula does occur postoperatively, early ligation of the lymphatic should be carried out. The flow of chyle from the fistula should be maintained by milk or chyle feedings, thus facilitating identification of the fistulous site.

9851 ABDOMINAL LYMPHOMA AND ALPHA CHAIN DISEASE. REPORT OF THREE CASES. (E.) Bonomo, L. (U. Bari Med. Sch., Italy), F. Dammacco, R. Marano and G. M. Bonomo. *Am. J. Med.* 52(1): 73-86, 1972.

Subjects consisted of 3 women (21, 23 and 44 yr of age) with alpha-chain disease in whom the predominant clinical features were malabsorption, abdominal pain, diarrhea and progressive general deterioration. Only slight hepatomegaly and/or splenomegaly were observed. At biopsy or autopsy there was seen to be extensive involvement of the small intestine and mesenteric lymph nodes with malignant lymphoma, with a dense pleomorphic infiltration with plasma cells. The serum protein electrophoretic pattern showed an abnormal band in 1, and only minor changes in the others. In 1 patient there was found in the serum and concentrated urine samples a peculiar protein, immunologically related to the heavy polypeptide chains of IgA but devoid of light chains; trace amounts were also detected in the saliva, but not tears, and in the cell extract of a culture of an intestinal biopsy specimen. This protein was antigenically deficient in comparison with some IgA myeloma proteins and sedimented more slowly than both IgA myeloma protein and albumin, showed marked electrophoretic heterogeneity, tended to form polymers and was of the α_1 subclass in all 3 patients.

9852 RELAPSING PEPTIC ULCER OF JEJUNUM AND THE 'ZOLLINGER ELLISON' SYNDROME. (Ger.) Wedell, J. (U. Dusseldorf Surg. Clin., Germany). *Internist. Prax.* 11(2):225-232, 1971.

9853 FOODBORNE OUTBREAK OF GASTROENTERITIS POSSIBLY OF MULTIPLE BACTERIAL ETIOLOGY. (E.) Janeway, C. M. (New Jersey State Dept. Health, Trenton), M. Goldfield and R. Altman. *Am. J. Epidemiol.* 94(2):135-141, 1971.

9854 GASTROENTEROLOGY IN CONNECTICUT. I. MANPOWER IN PRIVATE PRACTICE. (E.) Simpson, J. A. (St. Vincent's Hosp., Bridgeport, Conn.), R. S. Rosson and H. M. Spiro. *Conn. Med.* 35(10):611-613, 1971.

9855 BEZOARS. (E.) Ateshian, B. (Georgetown Hosp., British Guiana). *Radiol. Technol.* 43(1):7-9, 1971.

9856 A CASE OF CONGENITAL CHLORIDE DIARRHEA. (Pol.) Hager Malecka, B. (Med. Acad. Dept. Clin. Pediatr., Katowice, Poland), F. Sliwa and C. Frontczak. *Pol. Tyg. Lek.* 26(22):829-831, 1971.

9857 INFLUENCE OF DISACCHARIDES ON THE DEVELOPMENT OF SYSTEMIC ACIDOSIS IN THE PREMATURE INFANT. (E.) Lifshitz, F. (Natl. Med. Ctr., Mexico City, Mexico), S. Diaz Bensussen and V. Martinez Garza. *Pediatr. Res.* 5(5):213-225, 1971.

9858 STOOL EXCRETION OF AMINES IN THE NORMAL INFANT AND IN CERTAIN PATHOLOGICAL CONDITIONS. (It.) Berio, A. (U. Genoa, G. Gaslini Pediatr. Clin., Italy), A. Di Stefano and R. Bellati. *Minerva Pediatr.* 23(15):660-667, 1971.

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9860 THE PROBLEM OF GASTROINTESTINAL CANCER IN INDIA. (E.) Paymaster, J. C. (Tata Mem. Ctr., Bombay, India) and P. Gangadharan. *Indian Pract.* 24(1):7-15, 1971.

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9862 BLEEDINGS FROM DIVERTICULI AND DUPLICATURES OF THE GASTROINTESTINAL TRACT IN CHILDREN. (Ger.) Hartl, H. (Pediatr. Hosp., Linz, Austria). *Chirurg* 42(8):369-372, 1971.

9863 BLUNT ABDOMINAL TRAUMA. (Ger.) Reiher, P. (Friedrichshain City Hosp., Berlin), W. Kleinau and J. H. A. Muller. *Dtsch. Gesundheitsw.* 26(31):1441-1445, 1971.

9864 NORMS OF DIAGNOSIS AND TREATMENT IN PEDIATRICS. CHRONIC DIARRHEA OF ENTERIC ORIGIN. (Sp.) Licastro, R. *Dia Med.* 43(17): 389-390, 1971.

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PARASITOLOGY

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	min	minute(s)
ADP	adenosine diphosphate	ml	milliliter(s)
AMP	adenosine monophosphate	mm	millimeter(s)
ATP	adenosine triphosphate	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotanamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotide phosphate
CNS	central nervous system	NADPH	reduced nicotinamide adenine dinucleotide phosphate
cpm	counts per minute	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	pg	picogram (10^{-12})
e.g.	for example	p.o.	orally
g	gram(s)	ppm	parts per million
µg	microgram(s)	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
i.m.	intramuscular	resp.	respectively
i.p.	intraperitoneal	Rev.	review (only in citations)
IU	international unit(s)	RNA	ribonucleic acid
i.v.	intravenous	s.c.	subcutaneous
kg	kilogram(s)	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase	SGPT	serum glutamic-pyruvic transaminase
m	meter(s)	U	unit(s)
M	molar	UV	ultraviolet
mEq	milliequivalent(s)	WBC	white blood cells (leukocytes), white blood count
mM	millimolar	yr	year(s)
µM	micromolar		
mC,µC	milli-,microcurie(s)		
mg	milligram(s)		

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

9892 DEMONSTRATION OF GLYCOGEN IN THE DEVELOPING LIVER OF THE CHICK EMBRYO AT VERY EARLY STAGES (BETWEEN THE THIRD AND SIXTH DAY OF INCUBATION), USING A HISTOCHEMICAL METHOD. (Fr.) Houssaint, E. (U. Nantes Embryol. Lab., France). *C. R. Soc. Biol. (Paris)* 165(2):401-404, 1971.

An adaptation of Schiff's periodic acid technique, as described by Hotchkiss and McManus in 1948, was used to demonstrate the presence of glycogen granules in 9 of 11 embryonic chick livers which were studied at the end of the fourth day of incubation, 6 of 8 which were studied at the end of the fifth. The earliest successful demonstration was made after the egg had been incubated for only 84 hours, with granules demonstrable in endodermic cells which were in the process of division and formation of hepatic mesenchyme.

9893 AN ULTRASTRUCTURAL STUDY OF PRIMARY CULTURES OF ADULT HUMAN LIVER TISSUE. (E.) Guillouzo, A. (Pontchaillou Hosp., Rennes, France), P. Oudea, Y. Le Guilly, M. C. Oudea, P. Lenoir and M. Bourel. *Exp. Mol. Pathol.* 16(1): 1-15, 1972.

Human liver fragments obtained by needle biopsy or surgically were cultured in plastic flasks, using Eagle's medium, human serum, and 55% O_2-5% CO_2 gas mixture. Primary cultures of human liver yield 2 types of epithelial cells: granular and clear. Each explant sends out one type only of epithelial cell, the other being suppressed, seemingly through a process of cell selection. On day 12 some granular cells were ultrastructurally identical to in vivo hepatocytes; chief similarities were general appearance of mitochondria and of the endoplasmic reticulum, the probable presence of peroxisomes, and the presence of lipofuscin granule-like peribiliary dense bodies and of bile canaliculi. Other cells in the same explants had fewer organelles, cytoplasmic filaments and lipid overload. Cells mostly had simpler ultrastructure by day 20 and intermediate morphologic patterns suggest that dedifferentiation rather than progressive cell selection may be responsible for such changes.

9894 ALKALINE PHOSPHATASE IN THE SUBCELLULAR FRACTIONS OF NORMAL AND DAMAGED HUMAN LIVER. (E.) Massarrat, S. (Phillips U. Med. Polyclin., Marburg/Lahn, Germany). *Enzyme* 12(4): 402-408, 1971.

The activity and distribution of alkaline phosphatase in the subcellular fractions of normal and damaged human liver were studied in specimens taken by laparotomy and by blind biopsy. Comparison of the 2 groups revealed that the percentage of extractable protein was considerably different only in the 12,500 g supernatants. A loss of 38% of the protein in the soluble fraction of the specimens taken by blind biopsy in the process of centrifugation was found when compared to the laparotomy specimens. In fatty liver no increase in alkaline phosphatase activity was seen when compared with the controls. The activity of alkaline phosphatase in the 600 g and 12,500 g fraction exceeded that in the soluble fraction (12,500 g supernatant), independent of the histologic findings in the liver. The activity of alkaline phosphatase was increased in some patients with acute or chronic hepatitis, while it was normal or only slightly increased in the sera. The correlation between the level of alkaline phosphatase in the sera and that in the non-soluble subcellular fractions was poor in acute and chronic hepatitis, but good in extrahepatic jaundice. The affinity of the enzyme of different fractions for the substrate was identical.

9895 REGENERATION OF THE GASTRIC EPITHELIA IN MICE. AN ELECTRON MICROSCOPIC STUDY. (E.) Tahara, E. (Hiroshima U. Sch. Med., Japan). *Hiroshima J. Med. Sci.* 20(1-2):65-99, 1971.

Regeneration of the mouse gastric mucosa following the mechanical induction of gastric ulcers in the fundus was studied with light and electron microscopy. Following injury, the first cells to appear were epithelial cells which composed the regenerated epithelium. These cells had notable mitotic figures and resembled surface and foveolar mucous cells. Epithelial regeneration was followed by the appearance of parietal cells (third day), mucus neck cells and endocrine cells (fifth day), and chief cells (fifteenth day). The stem cells for all 6 epithelial cell types were undifferentiated, but in many cases these cells differentiated into cells with a single cell function. In some cases, cells with 2 cell functions appeared: e.g. endocrine cells containing zymogen-like granules, endocrine cells with mucus granules, parietal cells with zymogen-like granules, and mucus neck cells containing zymogen granules. These results indicate that these cells develop from undifferentiated cells, but mucus neck cells may become transformed into chief cells. Many large (200-800 mμ) intramitochondrial dense bodies were observed in surface and foveolar cells as well as in glandular cells during regeneration. These bodies, which may be glycoprotein, were more frequently observed in immature epithelial cells than in mature cells.

9896 INFLUENCE OF BILE AND PANCREATIC SECRETIONS ON THE SIZE OF THE INTESTINAL VILLI IN THE RAT. (E.) Altmann, G. G. (U. Western Ontario Health Sci. Ctr., London, Canada). *Am. J. Anat.* 132(2):167-177, 1971.

In 5 rats whose duodenal papilla and small portion of the duodenum were transplanted to an isolated ileal segment and after 1 mo showed an average villus size index of 298 upon autopsy as compared to 129-155 in surgical biopsies at the time of transplantation. The villus size indexes were gradually lower distalward along the ileal segments but remained at a relatively high level. In 7 rats the duodenal papilla and small duodenal segment were transplanted to the lower functional ileum. A month later villus size was elevated to a maximum, around 299, just distal to the transplantation size which had a normal villous size of less than 137. Five rats had an upper portion of their pancreatic biliary duct carrying bile only implanted into an isolated ileal segment. At autopsy the villus size index was 222 near the proximal end which contained the implanted bile duct as compared to 124 to 144 shown on previous surgical biopsies in the isolated ileal segments. The bile duct implants generally caused less villus enlargement in isolated ileal segments than the transplants of the duodenal papilla. In 3 animals in which the bile duct was implanted into an isolated ileal segment, and only the pancreatic secretions drained through the duodenal papilla, this papilla was transplanted to the functional ileum. A month after operation, villus size increased from normal values of 113 and 137 to a maximum of 286. In general the influence of duodenal papilla draining pancreatic sections only was similar to the influence of the duodenal papilla draining both bile and pancreatic secretions. Therefore, villus enlarging factors influenced by pancreatic secretions appear to reach the intestine by way of the duodenal papilla.

9897 ULTRASTRUCTURE OF THE ENLARGED CECUM IN GERMFREE RATS. (E.) Gustafsson, B. E. (Karolinska Inst., Stockholm, Sweden) and A. B. Maunsbach. *Z. Zellforsch. Mikrosk. Anat.* 120(4):555-578, 1971.

9898 HISTOLOGIC AND KARYOMETRIC STUDIES ON THE LIVER OF ANESTHETIZED RATS. (Ger.) Adhami, H. (U. Erlangen Inst. Anat., Nuremberg, Germany) and U. Bosse. *Z. Mikrosk. Anat. Forsch.* 83(4):441-450, 1971.

9899 ULTRAHISTOCHEMICAL DEMONSTRATION OF FREE INORGANIC ORTHOPHOSPHATE (Pa) IN THE LIVER CELL OF THE ALBINO MOUSE. PRESERVATION OF THE STRUCTURE OF THE HEPATIC CELL AFTER FREEZING IN SITU AND FREEZE SUBSTITUTION. (Ger.) Halbhuber, K. J. (Friedrich Schiller U. Inst. Anat., Jena, Germany), H. J. Stibenz and G. Geyer. *Z. Mikrosk. Anat. Forsch.* 83(4):569-583, 1971.

9900 A SCANNING ELECTRON MICROSCOPIC OBSERVATION ON THE RAT GASTRIC MUCOSA. (Jap.) Ogata, T. (Univ. Med. Sch., Okayama, Japan), A. Nabeyama, F. Murata and H. Matsuda. *Stomach Intest. (Tokyo)* 6(9):1191-1195, 1971.

9901 IMMUNOFLUORESCENT STAINING OF RAT GASTRIC PARIETAL CELLS BY HUMAN ANTIBODY UNRELATED TO PERNICIOUS ANAEMIA. (E.) Muller, H. K. (Monash U, Dept. Pathol., Melbourne, Australia), A. R. McGiven and R. C. Nairn. *J. Clin. Pathol.* 24(1):13-14, 1971.

9902 ULTRASTRUCTURAL SPECIFICITY IN REGENERATING SMOOTH MUSCLE. (E.) McGeachie, J. K. (U. Western Australia Dept. Anat., Nedlands). *Experientia* 27(4):436-437, 1971.

9903 AN UNUSUAL BASEMENT MEMBRANE UNDERLYING INTESTINAL EPITHELIUM OF THE PLATYPUS (ORNITHORHYNCHUS ANATINUS). (E.) Atkins, A. M. (Monash U. Dept. Anat., Clayton, Australia) and W. J. Krause. *Experientia* 27(6):686-688, 1971.

9904 MORPHOLOGY OF THE PANETH CELLS OF THE MOUSE AFTER TREATMENT WITH ACTINOMYCIN C. (Ger.) Linss, W. (Friedrich Schiller U., Inst. Anat., Jena, Germany). *Acta Histochem. (Jena)* Suppl. 11:211-216, 1971.

9905 THE EFFECT OF ADRENALECTOMY UPON THE FINE STRUCTURE OF RAT LIVER CELLS. (Ger.) Franke, H. (Friedrich Schiller U. Inst. Pathol. Physiol., Jena, Germany), A. Schrempel and E. Goetze. *Acta Biol. Med. Ger.* 26(4): 791-798, 1971.

9906 PROPERTIES OF THREE GLYCOSYLTRANSFERASES FROM RAT INTESTINAL MUCOSA. (Fr.) Frot Coutaz, J. (UER Lyon South, Oullins, France) and R. Got. *Biochimie* 53(5):595-601, 1971.

9907 X-RAY SEGMENTAL ANATOMY OF HEPATIC ARTERIES. (Rus.) Savchenko, A. P. (1st Med. Inst., Moscow), G. P. Filimonov and T. V. Privezentseva. *Khirurgiia (Mosk.)* 47(10): 50-55, 1971.

9908 MITOTIC CYCLES OF 'EARLY, OR LATE' DIVIDING CELLS OF REGENERATING LIVER IN RAT. (Rus.) Beliaeva, I. D. (Inst. Biol., Moscow). *Biull Eksp. Biol. Med.* 72(7):85-87, 1971.

9909 ARTERIALIZATION OF THE DISTAL PART OF THE PORTAL VEIN. A RADIOLOGICAL STUDY. (Fr.) Nahum, H. (Beaujon Hosp., Clichy, France), J. N. Maillard and M. Levesque. *Ann. Radiol. (Paris)* 14(7-8):567-573, 1971.

See also number: 10011

9910 EFFECTS OF GLUCOSE, SUCROSE, AND LACTOSE ON INTESTINAL DISACCHARIDASES IN THE RAT. (E.) Jones, D. P. (Wayne State U. Hutzel Hosp. Med. Unit, Detroit, Mich.), F. R. Sosa and E. Skromak. *J. Lab. Clin. Med.* 79(1):19-30, 1972.

High lactose (68%) diet consistently caused the highest activities and sucrose feeding the lowest activities of intestinal lactase, sucrase and maltase. This was evident in whole gut and mucosa and was greatest in the middle segments of the intestine. Sucrose feeding gave the lowest activity of all 3 disaccharidases and differences were detectable after 1 week of feeding, were maximal at 3 weeks, and persisted up to 12 weeks. The dietary effects were reversible, and were not secondary to caloric deficits in rats fed lactose due to their inability to hydrolyze or absorb lactose. The differences were also not due to changes in intestinal weight or in intestinal protein content and therefore represented differences in enzyme activity. Intestinal disaccharidases in the rat do adapt to dietary sugars, and the 3 major enzymes tested responded to those sugars as a unit.

9911 PERFUSION OF THE HAMSTER JEJUNUM WITH CONJUGATED AND UNCONJUGATED BILE ACIDS: INHIBITION OF WATER ABSORPTION AND EFFECTS OF MORPHOLOGY. (E.) Teem, M. V. (Mayo Clin., Rochester, Minn.) and S. F. Phillips. *Gastroenterology* 62(2):261-267, 1972.

In Syrian Golden hamsters, closed loop preparations of jejunum were perfused with solutions simulating hamster plasma. In experimental studies, after baseline studies with the perfusion medium, the loop was perfused with solutions of bile acids. Deoxycholic and chenodeoxycholic acid at 2.5 mM significantly decreased water absorption from the intestinal segment; this effect was not significant at 1 mM and was even more pronounced at 4 mM. Cholic acid at 8 mM did not reduce absorption. Conjugates of deoxycholic acid significantly reduced water absorption at 4 mM and even more so at 8 mM; there was no difference between the effects of the glycine and taurine conjugates at 8 mM, although glycodeoxycholate had the greater effect at 4 mM. Conjugates of chenodeoxycholic and cholic acid at 4 and 8 mM did not impair water absorption. When perfusion with 4 mM unconjugated deoxycholic acid was preceded and followed by control solution, water absorption was strikingly inhibited. In 2 of 3 hamsters, water was secreted into the bowel during perfusion with bile acid; with reinstitution of control solution, water absorption approached control levels. No consistent histologic abnormalities followed perfusion with control solution. The most marked changes followed 4 mM unconjugated deoxycholic acid and all showed loss of the epithelium at the villous tips, with erosion of villi in some areas; similar but less marked changes were seen with 4 mM chenodeoxycholic acid; these changes were not seen with other bile acids. Absorption of infused bile acids varied from 17.5-42.7% of the dose of 4 mM unconjugated acid and 1.1-7.0% of tauro- and glycodeoxycholic acid. Duodenal contents showed predominantly the glycine and taurine conjugates of cholic and chenodeoxycholic acids, with smaller amounts of conjugated deoxycholic acid.

9912 EFFECT OF DIETARY TAURINE ON FECAL BILE SALT EXCRETION IN RATS AND HAMSTERS FED CHOLESTYRAMINE. (E.) Cook, D. A. (Mead Johnson Res. Ctr., Evansville, Ill.), L. M. Hagerman and D. L. Schneider. *Proc. Soc. Exp. Biol. Med.* 138(4):830-834, 1971.

Dietary taurine increased fecal bile salt excretion by 44 to 56% in rats and by as much as 80% in hamsters fed cholestyramine. Taurine administration may be a feasible method if increasing fecal bile salt excretion at a given level of cholestyramine intake or for maintaining a set bile salt excretion rate with lower levels of the cholestyramine resin. Cholestyramine has a greater affinity for taurine-conjugated bile salts than for the corresponding glycine derivatives. Plasma cholesterol levels were not affected, even when bile salt excretion was increased 12-fold and probably reflects the ability in the rat for increased hepatic synthesis to compensate for the increased catabolism. In species in which the rate of cholesterol catabolism exceeds the rate of synthesis a subsequent decrease in cholesterol levels should be expected. The increased liver taurine levels from 2-10 fold had no effect on growth, food or water consumption, or organ weights. There is a direct correlation between increased fecal taurine excretion and decreased proportion of taurine conjugated bile salts in bile.

9913 ANALYSIS OF THE INHIBITORY EFFECT OF BIGUANIDES ON GLUCOSE ABSORPTION: INHIBITION OF ACTIVE SUGAR TRANSPORT. (E.) Caspary, W. F. (U. Gottingen Dept. Med., Germany) and W. Creutzfeldt. *Diabetologia* 7(5):379-385, 1971.

In incubated rings of hamster small intestine in vitro, biguanides inhibited transport of D-glucose, D-galactose and 3-O-methyl-D-glucose but had no effect on the transport of D-fructose. If concentration far below Km = 10^{-5}M was used, D-Xylose transport could be inhibited, but not at concentrations used during a D-xylose tolerance test (18 mM). With D-fructose or D-glucose as substrates, lactate formation by intestinal tissue was increased in the presence of biguanides. Minimal inhibitory concentrations on transport of D-galactose for butylbiguanide, phenethylbiguanide and for dimethylbiguanide were

2×10^{-3} M, 10^{-3} M and 6×10^{-3} M, resp. The metabolite of phenethylbiguanide (1-(4-hydroxy-beta-phenethyl)-biguanide) , increased glucose metabolism but did not affect glucose uptake. Active intestinal transport inhibition in vitro may explain the decreased glucose absorption observed by other authors in vivo in man and animals after biguanides.

9914 GLUCOSE AND FRUCTOSE AND ABSORPTION IN CHRONICALLY IMMOBILIZED RAT. (E.) Gass, G. H. (Southern Illinois U. Dept. Physiol., Carbondale), W. M. W. Yau and M. F. Nudd. *Comp. Biochem. Physiol.* 41(1A):225-233, 1972.

Significantly more deaths and less growth occurred in restrained than control rats and no deaths occurred after the thirteenth week of restriction. Restrained rats showed an upward trend in plasma glucose concentration during absorption after 5, 10, 15, 20 and 25 weeks of experimental housing; however, no differences were observed in gastric emptying or in glucose absorption after a test meal administration. The quantity of fructose absorbed was consistently higher in the restrained state; furthermore, the longer the exposure to restraint the greater this difference became. The increase in ability of restrained rats to absorb fructose is apparently either due to a stimulatory effect on intestinal uptake or due to a change in metabolic utilization of sugar occurring during chronic immobilization.

9915 CARBOHYDRATE TOLERANCE STUDIES WITH 3-DAY-OLD INFANTS. (E.) Anderson, T. A. (U. Iowa Hosps., Iowa City), J. Fomon and L. J. Filer. *J. Lab. Clin. Med.* 79(1):31-37, 1972.

Carbohydrate tolerance tests were performed with 90 infants ranging from 61-86 hr of age, using various derivatives of corn starch. In all but 2 of 30 studies with glucose, maltose, Dextri-Maltose and Dextrose-Equivalent 11, the peak concentration of glucose in blood was recorded within 60 min. The maximum increase in glucose concentration occurred after glucose feeding. Starch hydrolyzate feedings gave intermediate values and feeding the 2 starch forms yielded minimal increases. Feeding a carbohydrate as a 20% aqueous solution led to greater peak increases in blood glucose concentrations and more prompt return toward prefeeding values than when the same carbohydrate was fed as a component of a formula containing protein and fat. The more rapid gastric emptying for starch solutions compared to glucose solutions apparently reflects the effect of postpyloric osmoreceptors sensitive to osmolarity of the gastric effluent.

9916 CALCITONIN INHIBITION OF VITAMIN D-INDUCED INTESTINAL CALCIUM ABSORPTION. (E.) Olson, E. B., Jr., H. F. DeLuca (U. Wisconsin Coll. Agric. Life Sci., Madison) and J. T. Potts, Jr. *Endocrinology* 90(1):151-157, 1972.

Isolated vascularly perfused rat small intestines from vitamin D-deficient rats exhibited a low rate of calcium absorption; this rate was doubled in rats receiving vitamin D. Ten units of purified porcine calcitonin infused into the arterial perfusate produced an immediate fall in calcium absorption in intestines from rats given vitamin D, but had no effect on vitamin D-deficient rats. Following a chronic calcitonin infusion of 1.25 units, vitamin D-induced calcium absorption fell steadily until the calcium absorption level of a vitamin D-deficient intestine was reached in 2 hr. In response to a high (500 U) calcitonin infusion into vitamin D-supplemented rat intestine, calcium absorption began to rise at or near the beginning of infusion and reached a very high maximum. Low levels of calcitonin may play an important and direct role in preventing hypercalcemia which results from excessive calcium absorption.

9917 DISSOCIATION OF INTESTINAL ACTIVE SUGAR TRANSPORT FROM (Na$^+$ + Cl$^+$) ATPase ACTIVITY. (E.) Gracey, M. (Princess Margaret Hosp. Child., Perth, Australia), V. Burke, M. Storrie and A. Oshin. *Clin. Chim. Acta* 36(2): 555-560, 1972.

Arbutin (p-hydroxyphenyl-beta-glucoside) an actively transported but non-metabolizable sugar was used in these in vitro studies. Control tissue arbutin concentration was 4.3 μmoles/ml tissue water after 25 min incubation; in the presence of 1 mM sodium deoxycholate for 25 min the tissue arbutin concentration was 1.1 μmoles/ml. Following incubation in 1 mM deoxycholate for 25 min the ATPase activity decreased markedly and failed to recover after subsequent incubation for a similar period in a medium devoid of bile salt. A clear dissociation was obtained for (Na$^+$ and K$^+$) ATPase activity of the small intestine and its capacity for active sugar transport in vitro.

9918 CORRELATION BETWEEN ^{47}Ca ABSORPTION AND INTESTINAL CALCIUM-BINDING ACTIVITY IN THE GOLDEN HAMSTER. (E.) Kallfelz, F. A. (New York State Vet. Coll., Ithaca) and R. H. Wasserman. *Proc. Soc. Exp. Biol. Med.* 139(1): 77-79, 1972.

Closed loops of duodenum or ileum were prepared in male golden hamsters, and a solution containing 10 mM CaCl$_2$ and 0.2 μCi of ^{47}Ca in 0.9% NaCl solution (pH 6.8) was injected into the intestinal loop, after which this closed segment was replaced in the abdominal cavity and the incision closed with wound clips. After 30 min. the animals were sacrificed and the intestinal segment was immediately removed and counted for total ^{47}Ca activity. After counting, each segment was incised lengthwise and the mucosa was stripped and prepared for analysis of the 38,000 g supernatant fraction for total protein and for calcium-binding activity, from which the specific activity of protein binding was calculated. The femur was also recovered and counted for ^{47}Ca. Absorption of the injected dose was significantly greater in the duodenum (66%) than in the ileum (36%). Femoral deposition reflected the difference in absorption, with retention of 0.60% and 0.30% of the injected dose, resp. The net calcium-binding activity of the duodenum (35.9%) was also significantly greater than that of the ileum (27.0%) as was the specific activity of protein binding, with values of 33.1 and 23.0%, resp.

9919 PREFERENTIAL RETENTION OF TAURINE-CONJUGATED BILE SALTS BY CHOLESTYRAMINE IN THE RAT ILEUM. (E.) Cook, D. A. (Mead Johnson Res. Ctr., Evansville, Ind.), L. M. Hagerman and D. L. Schneider. *Proc. Soc. Exp. Biol. Med.* 139(1):70-73, 1972.

A 30-cm loop of terminal ileum in Wistar rats was instilled with saline and the contents were analyzed for total bile salt content with hydroxysteroid dehydrogenase using a purified cell-free enzyme preparation. Endogenous bile salts were rapidly absorbed from the ligated ileum, such that 80% of the bile salts in the ileum at the time of saline instillation were absorbed within 2 hr and almost 100% within 4 hr. In the second group of rats, 4 hr prior to instillation of the bile salt solutions, 1 ml of saline was instilled into the ileum to enhance endogenous bile salt absorption. Of the bile salts instilled without cholestyramine, 79-84% were recovered from the intestines of the zero-hour rats, while recovery was 87-96% when a bile salt-cholestyramine complex (20-25 μmoles/ml of bile salt in 0.9% NaCl, incubated with 10 mg/ml of cholestyramine). In the absence of cholestyramine, slightly less taurine-conjugated than glycine-conjugated bile salts remained in the ileum at 1 and 2 hr after instillation. With each bile salt studied, the amounts remaining in the ileum at 1 and 2 hr were greater when given with cholestyramine than when given alone. In the presence of cholestyramine, ileal bile salt retention at 1 hr was greatest with taurochenodeoxycholate, less so with glycochenodeoxycholate, far less than this with taurocholate and even less so with glycocholate; at 2 hr, in decreasing order, taurochenodeoxycholate, taurocholate, glycochenodeoxycholate and glycocholate. In the presence of cholestyramine, 25-45% of the exogenous trihydroxy bile salts and 39-53% of the dihydroxy salts in the ileum at zero hour remained there after 2 hr.

9920 STUDIES OF INTESTINAL RESORPTION AND SECRETION. V. THE EFFECT OF INTRALUMINAL PRESSURE ON RESORPTION OF WATER FROM THE SMALL INTESTINE OF THE CONSCIOUS RAT. (Ger.) Dennhardt, R. (Philipps U. Inst. Appl. Physiol., Germany) and F. J. Harberich. *Z. Gesamte Exp. Med.* 156(2):151-156, 1971.

In unanesthetized rats undergoing aqueous perfusion of the small intestine by means of an open system involving extracorporeal circulation, intraluminal pressures ranged from 2-25 mm Hg. Progressive increase of the intraluminal pressure resulted in a linear increase of the amount of water resorbed, to a maximum of 6 times the volume initially. This was accompanied by a linear increase of the amount of sodium which appeared in the returning perfusate, to a maximum of twice the original concentration recorded. Both phenomena were attributed to stretching and unfolding of the lumen, resulting in the accessibility of a progressively larger resorptive surface as intraluminal pressure was increased.

9921 NONABSORBED INDICATORS: A COMPARISON OF PHENOL RED AND INULIN-^{14}C AND EFFECTS OF PERFUSION TECHNIQUE. (E.) Miller, D. L. (U. Iowa Dept. Intern. Med., Iowa City) and H. P. Schedl. *Gastroenterology* 62(1):48-55, 1972.

The effects of luminal losses of nonabsorbed indicators (phenol red and inulin-^{14}C) used in intestinal absorption studies were investigated in the rat by comparing single-pass perfusion and recirculation techniques. In single pass infusion a relatively large volume and amount of indicator passed through the lumen once, while in the recirculation technique a relatively small volume and amount of indicator was passed through the lumen repeatedly. While the recirculation technique revealed a greater percentage loss, the absolute rate of loss of indicator was similar for the two techniques. This increased percentage loss of indicator was reflected as a doubling of the error in determining net water flux, the estimates of secretion thus being falsely elevated. The loss of phenol red was observed to be greater than the loss of inulin, and approximately 20% more phenol red was adsorbed from the mucosal surface. Thus, the results of transport studies are affected by the indicator and the technique used.

9922 DEVELOPMENTAL PATTERN OF SUGAR AND AMINO ACID TRANSPORT IN THE POSTNATAL RAT SMALL INTESTINE. (E.) Fitzgerald, J. F. (Indiana U. Sch. Med., Indianapolis), S. Reiser and P. A. Christiansen. *Pediatr. Res.* 5(12): 698-703, 1971.

Transport, as measured by intracellular accumulation, of both sugars (alpha-methyl-D-glucoside and D-galactose) and the 3 amino acids (L-valine, L-lysine and glycine) was maximal in early postnatal life at 2-5 days. The pattern of decrease in transport to adult level for both sugars and valine was similar; 50% occurred between 5 and 16 days, 33% between 16 and 30 days and 15-20% between 30 and 80 days. Proximal intestine predominance in sugar transport was not observed until the 22nd day. Lysine showed a small decrease (10%) between 2 and 16 days, the largest (56.4%) decrease between 16 and 30 days and a decrease between 30 and 80 days nearly twice as large as the decrease of any other compound at the comparable age span. Lysine exhibited 70% its total decrease between 2 and 16 days. Developmental data support the thesis of separate transport systems for neutral, basic and glycine-preferring amino acids.

9923 THE DISTRIBUTION OF Na IN INTESTINAL VILLI DURING ABSORPTION OF SODIUM CHLORIDE. (E.) Haljamäe, H. (U. Goteborg Dept. Histol. Physiol., Sweden), M. Jodal, O. Lundgren and J. Svanvik. *Acta Physiol. Scand.* 83(2): 283-285, 1971.

During the absorption of NaCl in feline jejunal segments, the amount of sodium per unit weight protein in the tips of intestinal villi is higher during resting blood flow than during intense vasodilation. Sodium absorption may be limited by blood flow. However, the low villus concentration of sodium found during ischemia suggests that sodium transport across intestinal epithelium is not limited by blood flow. The existence of a countercurrent exchange mechanism in the feline intestinal mucosa could explain results, since vasodilation and ischemia reduce, or completely abolish, the efficiency of the intestinal countercurrent multiplier and, hence, the concentration gradient along the villi.

9924 STUDIES ON MONOSACCHARIDE PERMEABILITY OF ARTERIAL TISSUE AND INTESTINAL SMOOTH MUSCLE; EFFECT OF INSULIN. (E.) Arnqvist, H. J. (Sch. Med., Linkoping, Sweden). *Acta Physiol. Scand.* 83(2):247-256, 1971.

The permeability of ^{14}C-labeled D-xylose and the accumulation of D-glucose-^{14}C were studied in rat and rabbit aorta and rabbit colon smooth muscle. There was always a rapid increase in the distribution of sucrose-^{14}C and sorbitol-^{14}C (in extracellular space) during the first 30 min of incubation confined to 40-50% of wet tissue weight. Initial D-xylose-^{14}C and D-glucose-^{14}C distributions were similar to those of sucrose and sorbitol but reached no equilibrium after 30 min. Instead there was a gradual increase persisting for 150 min. Rat and rabbit aorta gave the same results. Hence, although sorbitol and sucrose are confined to the extracellular space, D-glucose and D-xylose can penetrate smooth muscle cell membrane. Rabbit colon activity continuously increased when incubated for 60-180 min in D-glucose-^{14}C; this elevated activity exceeded a distribution in the extracellular space. The membrane permeability of D-glucose is rate limiting for the metabolism of glucose in the smooth muscle cells. Insulin increased moderately glucose accumulation in rat aorta and rabbit colon and xylose accumulation in rabbit colon.

9925 NEOMYCIN ABSORPTION IN MAN. STUDIES OF ORAL AND ENEMA ADMINISTRATION AND EFFECT OF INTESTINAL ULCERATION. (E.) Breen, K. J. (VA Hosp., Nashville, Tenn.), R. E. Bryant, J. D. Levinson and S. Schenker. *Ann. Intern. Med.* 76(2):211-218, 1972.

The absorption of neomycin (2 g) was compared after p.o. or enema administration in normals and patients with liver disease and after p.o. administration in patients with active peptic ulcer disease and with regional enteritis and after enemas in patients with ulcerative colitis. No side effects were noted in patients. Serum levels in fasting normals were higher than in nonfasting normals, while urine levels were nonsignificantly higher. In normals, urinary excretion was not reduced by 40 ml of aluminum hydroxide gel before p.o. neomycin or cleansing enemas before neomycin retention enemas. There was no further effect on serum or urine levels when enema retention time was increased beyond 1.0-1.9 hr. There was no difference in cumulative urinary excretion between the p.o. and enema studies at 0-4, 0-24 and 0-48 hr. There was no difference between the p.o. and enema studies with regard to urinary neomycin excretion for each of the individual subgroups of patients, while this value was elevated in normals. Serum levels also tended to be similar after p.o. and enema administration. Serum drawn at 24 hr was usually free of neomycin. Patients with active peptic ulceration (6) and regional ileitis (2) did not absorb more neomycin than normals or patients with liver disease; the same held for patients with active ulcerative colitis (4).

9926 MULTICOMPARTMENT ANALYSIS OF THE ABSORPTION KINETICS OF WARFARIN FROM THE STOMACH AND SMALL INTESTINE. (E.) Kekki, M. (Univ. Cent. Hosp., Helskini), K. Pyörälä, O. Mustala, H. Salmi, J. Jussila and M. Siurala. *Int. Z. Pharmakol. Ther. Toxikol.* 5(2):209-211, 1971.

A single dose of 1 mg/kg sodium warfarin dissolved in 100 ml of water was given to 5 adult volunteers by intragastric instillation. The absorption of the same dose from the duodenum in 4 volunteers was studied using a special tube system equipped with 2 balloons, between which a segment of duodenum could be isolated after inflation of the balloons with air. The drug solution was instilled into this isolated segment. One week later all the test subjects were given the same dose i.v. and plasma samples were collected at appropriate intervals. Experimental data was simulated on an analog computer based on the assumption that the kinetic behavior of warfarin with regard to its distribution in various body compartments, its fluxes between these compartments and its rate of metabolism is identical in all types of experiments. The absorption of warfarin from the human stomach was shown to obey first-order kinetics, with an absorption rate constant that varied from 3.55 to 1.23/hr. When the gastric pH was decreased, there was a definite retardation of absorption after the initial exponential phase. The absorption rate constant during the initial phase of duodenal absorption varied from 5.28 to 3.58/hour. Both gastric and duodenal absorption were retarded with decreased intraluminal pH. Warfarin was extremely rapidly absorbed from the duodenum at pH 8, although almost entirely in ionized form at this pH.

9927 EFFECT OF GASTRECTOMY AND OF AN ANTICHOLINERGIC DRUG ON THE GASTROINTESTINAL ABSORPTION OF A SULFONAMIDE IN MAN. (E.) Antonioli, J. A. (U. Lausanne Dept. Med., Switzerland), J. L. Schelling, E. Steininger and G. A. Borel. *Int. Z. Klin. Pharmakol. Ther. Toxikol.* 5(2):212-215, 1971.

After a p.o. dose of 1 g sulfamethazole, blood levels were followed for 24 hr in 2 patients without any acute or chronic gastrointestinal disease (one of whom served as control and the other of whom received 15 mg of propanethine HBr^3 at 30 min before and again at the beginning of the test) and a patient who had undergone subtotal gastrectomy several yr previously, but was asymptomatic at this time. In the control patient, the increase in plasma concentration occurred in 3 steps: an initial rise (within 30 min), a brief plateau (less than 2 hr) and a second, very rapid rise (less than 30 min), followed by a gradual decrease. In the gastrectomized patient, the sole step consisted of a rapid rise (less than 30 min) followed by a gradual decline. In the patient treated with the anticholinergic, there was a small, rapid rise, a longer plateau (3 hr) and a second gradual rise (over 6 hr). Maximal levels were greatest in the control (at 3-4 hr), and less so, but essentially identical in the gastrectomized (at 30-60 min) and medicated (at 9 hr) patients.

9928 THE INFLUENCE OF BLOOD FLOW ON THE ABSORPTION OF POLYALCOHOLS FROM THE JEJUNUM OF RATS. (Ger.) Winne, D. (U. Tubingen Pharmacol. Inst., Germany) and J. Remischovsky. *Nauyn Schmiedebergs Arch. Pharmacol.* 270(1):22-40, 1971.

Jejunal loops of Wistar rats were perfused with a variety of ^{14}C-labeled polyalcohols of different molecular weights (in buffered saline). Blood flow and rates of disappearance from intestinal lumen and appearance in intestinal venous blood were measured simultaneously. A decreased blood flow (from approximately 1.8 to 0.25 ml $min^{-1}g^{-1}$ wet tissue) decreased the disappearance and appearance rates of the test substances and their possible metabolites. An increase in blood flow had the reverse effect. With increasing molecular weights there was a decrease in these transfer rates and decrease in their dependence on blood flow. The resorption of ethyl alcohol was most dependent, that of adonitol and mannitol least dependent on blood flow. The resorption rate of glycerol showed a different dependence on blood flow in experiments with increasing and in those with decreasing blood flow. This was explained by a decrease in permeability of the epithelium for glycerol with time. Blood-flow-independent permeability coefficients of the polyalcohols for the intestinal epithelium of the rat were calculated by means of a 3-compartment model and were found to correspond to an equivalent pore radius of 3.9±0.1 A.

9929 FAT ABSORPTION IN RAT SMALL INTESTINE WITH SPECIAL REFERENCE TO CIRCADIAN RHYTHM. (Ger.) Ceurremans, M. (U. Wurzburg Inst. Anat., Germany). *Z. Zellforsch. Mikrosk. Anat.* 119(3):334-354, 1971.

Light and electron microscope studies were carried out on the jejunum of 162 Wistar rats (150-300 g) 20 sec to 20 min after the injection of fats at different times of day. Fat resorption showed a characteristic circadian rhythm: it was highest at 2 AM and lowest at 2 PM. The frequency of micropinocytosis (micropinocytic pits/110 microvilli) was 4.78 in starved, 5.06 in normal rats. One min after administration of corn oil chyme 3.55, after 1/16 M NaCl solution 4.37, after butter fat 5.50, after ox tallow 7.16, after lard 7.66 and after Mazola (corn oil) 9.25; 2.5 min after Mazola admin. micropinocytosis decreased to 8.23, after 5 min to 7.67, after 10 min to 6.76 and returned to initial values between 10 and 15 min after injection. Statistical analysis suggested that fat can be absorbed through micropinocytosis, especially in the initial stages of absorption. The results also indicate that frequency of micropinocytosis is influenced by chemical composition and physical-chemical properties of the administration fat.

9930 CORTICOSTEROIDS AND THE DEVELOPMENT OF INTRINSIC FACTOR-MEDIATED VITAMIN B_{12} ABSORPTION IN THE RAT. (E.) Gallagher, N. D. (U. Sydney Dept. Med., Australia) and K. E. Foley. *Gastroenterology* 62(2):247-254, 1972.

Changes in vitamin B_{12} absorption from birth to weaning were studied in unanesthetized rats. ^{57}Co-labeled vitamin B_{12} p.o., absorption decreased 15 days after birth, coinciding with a rapid rise of intrinsic factor in the stomach. The transition to intrinsic factor-mediated absorption occurred at an earlier age in rats which were treated with cortisone. Absorption of the vitamin by cortisone-treated 12 day old rats was similar to that in the weanling. The absorptive mechanism was saturated when the dose of vitamin was increased. There was a 6-fold increase in intrinsic factor in the stomach of cortisone-treated rats. ACTH injected repeatedly resulted in elevated intrinsic factor levels and in an earlier decrease in the absorption of the vitamin. The time of onset of the intrinsic factor mechanism may be related to effects of endogenous corticosterone on gastric and intestinal epithelial cell function.

9931 EFFECT OF ALLOXAN DIABETES, INSULIN, AND DIABETOGENIC HORMONES (THYROXINE, HYDROCORTISONE, AND OXYTOCIN) ON THE INTESTINAL TRANSPORT OF GLYCINE. (Ger.) Mahmood, A. and S. D. Varma (Oakland U. Inst. Biol. Sci., Rochester, Mich.). *Z. Gastroenterol.* 9(6):425-428, 1971.

By means of the everted sac technique it was demonstrated that glycine transport in the rat small intestine decreased from the pylorus to the jejunum and was reduced by alloxan monohydrate (200 mg/kg i.p.) and i.m. administration of thyroxine (0.5 mg/day) and oxytocin (0.1 I.U./day) for 6 days. Glycine transport was doubled by i.m. administration of hydrocortisone (2.5 mg/day) and tripled by insulin (0.4 I.U./day) for 6 days. In alloxan diabetes inhibition of glycine transport is apparently associated with hypoinsulinism since administration of insulin to these animals increased transport activities. This finding and the increased glucose transport previously found in diabetic rats suggest that intestinal transport of both sugars and amino acids is under endocrine control. Since diabetes and thyroxine affect sugar and amino acid transport in different ways, it is likely that different transport mechanisms are involved. This hypothesis is supported by the insulin-dependence of glycine, but not glucose, transport. The effect of hydrocortisone on transport might be associated with its effect on the sodium pump.

9932 STUDIES ON TRANSMURAL POTENTIALS IN VITRO IN RELATION TO INTESTINAL ABSORPTION. VI. THE EFFECT OF SUGARS ON ELECTRICAL POTENTIAL PROFILES IN JEJUNUM AND ILEUM. (E.) Lyon, I. (Bennington Coll. Science Div., Vt.) and H. E. Sheerin. *Biochim. Biophys. Acta* 249(1):1-14, 1971.

A microelectrode recording technique used to investigate intestinal active transport of small mammals by measuring transmembrane potential differences across the epithelium of rat intestine is presented. In vitro transmembrane potential differences of rat jejunum and ileum were shown to be stable, reproducible and able to respond quickly to changes in the composition of extracellular media. Epithelial cell impalement in normal Krebs-Henseleit buffer always resulted in a potential change with the cell interior being negative to both the mucosal and serosal media. Various actively transported sugars added to the mucosal bathing medium caused a marked increase in the transserosal potential difference in both jejunum and ileum. Oubain added to the serosal bathing caused a 44% reduction in transmural potential difference which was greater than when oubain was added to the mucosal medium. In addition, serosal oubain depressed the sugar-dependent increase in transmural potential difference and both effects were due primarily to a decreased transserosal potential difference. Phlorhizin added to the mucosal produced a reduction in the glucose-dependent transmural potential difference which was not observed when phlorhizin was added to the serosal bathing medium. These findings are consistent with and lend support to the concept of a serosal ion extrusion mechanism coupled with active sugar transport in the mucosal epithelial cell of rat intestine.

9933 THE STRUCTURE AND FUNCTION OF INTESTINAL LYMPHATICS AND THE INFLUENCE OF IMPAIRED LYMPH FLOW ON THE ILEUM OF RATS. (E.) Kalima, T. V. (U. Helsinki 2nd Dept. Surg.). *Scand. J. Gastroenterol.* 6(Suppl. 10):1-87, 1971.

Obstruction of the mesenteric lymphatics in rats by a combined chemical and mechanical method caused dilatation of the ileum, edema of the intestinal wall, expansion of intestinal villi, and pathological dilatation of lymphatics in all layers of the intestine after 8 days or less. In rats that did not develop infection or impaired intestinal passage due to adhesions, long-term lymphatic obstruction (9-70 days) produced inflammation in all 3 layers of the intestine, an apparent decrease in the number of villi, and interstitial edema. A few necrotic and infected areas were observed at the base of mucosal glands, and increased fibrosis was present in the submucosa and serosa. In 15 rats that developed severe infections, impaired passage and, in 4 cases, intestinal fistulas, lymphatic obstruction for 9-70 days caused infiltration of round cells, formation of granulation tissue in the serosa, and vasculitis of the lymphatics which was accompanied by thrombosis and obstructive lymphangitis in the most severe cases. Several granuloma-like structures were observed in the thrombosed lymph vessels of 5 rats. Electron microscopy showed that some of the lymphatics were closed while others were still patent in these animals. In 13 rats whose lymphatics became reorganized after lymphatic obstruction most of these changes disappeared, but the amount of granulation tissue remained increased and fibrosis was abnormally pronounced. Excretion of ^{131}I-polyvinylpyrrolidone was 73% higher in rats with lymphatic obstruction than in controls.

9934 DIRECT STUDY OF THE ROLE OF XYLOSE AND SODIUM IN CALCIUM ABSORPTION BY JEJUNAL PERFUSIONS IN MAN. PRELIMINARY RESULTS. (Fr.) Chapuy, M. C., D. Pansu and G. Vignon (Edouard Herriot Hosp., Lyon, France). *Lyon Med.* 226(13): 99-102, 1971.

Ca^{++} absorption was measured directly in 6 normal fasting adults by perfusing a solution containing 90 mg Ca^{++} as the gluconate and various concentrations of NaCl, glucose, and xylose; polyethylene glycol was used as a nonabsorbable marker to measure changes in water transport. When 45 µEq/min of Ca^{++} was perfused, Ca^{++} absorption varied from 4.2-13.5 µEq/min in 25 cm of intestine; the rate remained relatively constant in each subject when a steady state was reached. Simultaneous absorption of water and Na^+ occurred in 5 of these 6 subjects, and secretion of water and Na^+ into the lumen occurred in 1 subject. Replacement of glucose by xylose decreased Ca^{++} absorption and caused water secretion even though the perfusion solution was isotonic. Ca^{++} absorption decreased significantly with decreasing Na^+ concentration. Since the decrease in Ca^{++} absorption caused by decreasing Na^+ concentrations was greater than that caused by xylose, Na^+ is probably essential for active transport to occur. Xylose might act by mechanisms independent of active absorption, but more research is needed to confirm these results.

9935 EFFECT OF ANTICHOLINERGIC AGENTS ON THE INTESTINAL ABSORPTION OF ^{59}Fe FERROUS CITRATE. (E.) Orrego-Matte, H. (J. J. Aguirre Hosp., Santiago, Chile), O. Fernandez and I. Mena. *Am. J. Dig. Dis.* 16(9):789-795, 1971.

Anticholinergic drugs were found to inhibit radioactive iron absorption by an effect on a gastric factor which is necessary for optimal iron absorption, and not by a decrease in acid secretion. The radioiron used in the tests was ^{59}Fe ferrous citrate (specific activity 26.0 mCi/mg Fe), 10 µ Ci of which were dissolved in water containing 250 µg of ferrous sulfate (92.4 µg Fe^{++}). Anticholinergics produced a decrease in absorption; ^{59}Fe ferrous citrate absorption in humans was reduced after administration of hexocyclium methosulfate; and absorption in rats was reduced after atropine. Delivery of radioiron intragastrically mixed with gastric juice prolonged the effect of atropine on iron absorption, but not when the radioiron was administered intraduodenally. Iron absorption decreased when radioiron was delivered intraduodenally in deproteinized acid gastric juice or 0.10 N HCl. No decrease occurred when radioiron was mixed with neutralized gastric juice. The results did not permit the determination of the exact mechanism of anticholinergic action, but they suggest a gastric effect independent of the effect on acid secretion.

9936 MODIFICATION OF DRUG ABSORPTION BY BACTERIAL TOXINS - I. THE INFLUENCE OF STAPHYLOCOCCAL ALPHA TOXIN AND Shigella dysenteriae TOXIN ON RESORPTION OF SODIUM SALICYLATE. (E.) Schejbalová, E. (Charles U. Inst. Pharmacol., Prague), J. Elis, Z. Jiřička and H. Rašková. *Toxicon* 9(4):367-372, 1971.

The effect of crude staphylococcal α-toxin (1/3 LD_{50} i.v.) and Shigella dysenteriae (1/10 LD_{50} i.v.) on the intestinal absorption of sodium salicylate was studied in rats. After p.o. administration of sodium salicylate its level in the blood and liver of staphylococcal α-toxin-intoxicated rats was significantly lower than in control animals, indicating an impaired absorption. Two types of histological changes were found in these animals. The first was characterized by shortening and thickening of villi (length 350-500 µ against 500-550 µ in controls; width 108-140 µ against 92-132 µ in controls), edema of the reticular core, and the presence of structureless oxyphilic precipitates under the basement membrane. The second type of change was characterized by intestinal villi of normal length with the width sometimes increased by edema, occasional disconnection of the superficial epithelial layer on the top of the villi by small foci of necrobiosis, and the same oxyphilic precipitate near the basement membrane. Shigella dysenteriae toxin also inhibited sodium salicylate absorption with a peak inhibition at 72 hr after treatment, at which time small foci of degeneration and necrobiosis in the epithelial layer were seen.

9937 INTESTINAL ABSORPTION OF RADIOIODINE LABELLED HUMAN SERUM ALBUMIN, MONO-IODOTYROSINE AND DI-IODOTYROSINE FOLLOWING ABDOMINAL RADIATION THERAPY. (E.) Cionini, L. (U. Florence Med. Sch., Italy), A. Becciolini, L. Dalla Palma and G. De Fiuli. *Acta Radiol.* [*Ther.*] *(Scand.)* 10(3):341-352, 1971.

The effect of ^{60}Co abdominal radiation therapy on the intestinal absorption of radioiodine-labelled human serum albumin, mono-iodotyrosine and di-iodotyrosine was studied in 50 female patients undergoing radiotherapy after total hysterectomy or bilateral oophorectomy. Ninety percent of the patients had altered absorption halfway through the treatment (2500-3000 R), and those who had no impairment by this time had none at the end. The damage appeared to be more serious in those patients who improved from the halfway point to the end of the treatment and less marked in those with further impairment. No definite relationship was evident between the frequency of stools and the degree of malabsorption. Impairment of di-iodotyrosine absorption was more marked than that of labeled serum albumin or mono-iodotyrosine. The damage caused by irradiation in the intestinal mucosa seems to affect the mechanism of parietal transit while the hydrolytic processes occur to a normal degree.

9938 INTERRELATION OF INTESTINAL TRANSPORT SYSTEM FOR MANGANESE AND IRON. (E.) Thomson, A. B. R., D. Olatunbosun and L. S. Valberg (Queen's U., Kingston, Ontario, Canada). *J. Clin. Lab. Med.* 78(4):642-655, 1971.

The site and kinetics of manganese absorption in the small intestine, and the effect of iron on manganese absorption were studied in rats and man. In iron-loaded rats, a similar proportion of manganese was taken up by the duodenum, jejunum and ileum with about 20% of this passing to the carcass. In iron deficiency, there was a significant increase in manganese uptake and transfer in the duodenum and a significant decrease in the jejunum. Manganese absorption was markedly enhanced by iron deficiency in both rats and man. In iron-loaded rats, manganese transfer was closely dependent upon dose and uptake was greater than transfer, whereas in iron deficiency, manganese uptake and transfer were greatly increased. In iron-deficient rats the addition of iron to the manganese perfusate was associated with a significant reduction in manganese absorption. Neither iron nor manganese had an inhibitory effect on absorption of the other metal except at high doses in iron-loaded rats. Greater amounts of Fe than Mn were absorbed from an equimolar mixture. No significant difference was observed between the iron-deficient and iron-loaded rats in the retention of absorbed Mn. Similar results were seen in patients with normal iron stores.

9939 ON THE MECHANISM OF MUTUAL INHIBITION AMONG SODIUM-DEPENDENT TRANSPORT SYSTEMS IN THE SMALL INTESTINE. A HYPOTHESIS. (E.) Semenza, G. (ETH Lab. Biochem., Zurich, Switzerland). *Biochim. Biophys. Acta* 241(2): 637-649, 1971.

The author proposes a mechanism to account for the observation that, despite transport in the small intestine by different carriers, sugars and amino acids mutually inhibited each other's uptakes. Using brush borders of everted strips of hamster intestine, it was found that both the inhibition of substrate influx and the stimulation of substrate efflux may be due to a local decrease of gradients of Na^+ (and of K^+) across the membrane. Equations are given for the Na^+-dependent unidirectional flux and for trans-inhibition of Na^+.

9940 INHIBITION OF AMINO ACID TRANSPORT IN RAT INTESTINAL RINGS BY TETRACYCLINE. (E.) Ling, V. (St. Justine Hosp., Montreal, Quebec, Canada) and C. L. Morin. *Biochim. Biophys. Acta* 249(1):252-259, 1971.

Tetracycline (400 mg/kg i.p.) given 4 hr before the study decreased (29.5% inhibition) the incorporation of L-^{14}C-lysine into trichloroacetic acid-precipitable protein by rat intestinal rings as compared to untreated controls. Intestinal rings were incubated for 40-50 min with alanine, lysine or cycloleucine. Compared to controls rats treated with tetracycline 4 and 8 hr before study showed no significant decrease in the intracellular accumulation of these amino acids. However, animals treated with tetracycline 12 hr prior to study showed a marked decrease (28.5% inhibition) in tissue accumulation of the 3 amino acids as compared to that in control rats. Tissue accumulation of cycloleucine in rats treated with tetracycline 12 hr previously was lower in treated than in controls after 5 min of incubation. No difference in the decline of residual intracellular radioactivity with ^{14}C-cycloleucine was found between intestinal rings from controls and treated animals. The velocity of alanine uptake was slowed by tetracycline at all alanine concentrations tested and at high concentrations the rate of increase slowed, consistent with a saturable transport mechanism. Total tissue water was similar in control and treated rats while the extracellular space was increased somewhat in treated animals. Histological examination of control and treated jejunum sections were normal and similar for both groups. Tetracycline may serve to reduce the amount of transport protein(s) which turns over rapidly and is needed for amino acid translocation and acts as a rate-limiting factor.

9941 BICARBONATES AND TRANSEPITHELIAL POTENTIAL DIFFERENCE IN RAT JEJUNUM INCUBATED IN VITRO. II. (It.) Faelli, A. (U. Milan Inst. Gen. Physiol., Italy) and G. Garotta. *Boll. Soc. Ital. Biol. Sper.* 47(1):29-32, 1971.

See also numbers: 10122, 10126, 10399, 10403

9942 ISOLATED RABBIT COLON PREPARATION: A SENSITIVE METHOD FOR THE BIOASSAY OF CAERULEIN AND RELATED SUBSTANCES. (E.) Montovani, P. (U. Parma Inst. Pharmacol., Italy) and M. Impicciatore. *Naunyn Schmiedebergs Arch. Pharmakol.* 271(3):330-334, 1971.

An isolated preparation of rabbit colon had high sensitivity to caerulein, the threshhold dose being 0.1-0.5 ng/ml. Eledoisin and cholecystokinin C-terminal heptapeptide were the only drugs with a more intense stimulant (contraction) action than that of caerulein. Indolealkylamines, histamine and bradykinin showed poor activity. Eledoisin and caerulein activities could be distinguished: rabbit small intestine when stored in cold Krebs solution showed persistent responsiveness (6-7 days) to eledoisin while its sensitivity to caerulein strongly decreased even by the second day. Tetradoxin abolished the motor response caused by caerulein but did not affect the one elicited by eledoisin. That the structures excited by caerulein are parasympathetic in nature cannot be excluded. Although atropine in high concentration only reduced the effect of caerulein, eserine potentiated the motor response caused by the peptide.

9943 INTESTINAL 5-HYDROXYTRYPTAMINE IN EXPERIMENTAL MECHANICAL ILEUS. (E.) Kaltiala, E. H. (U. Oulu Dept. Surg., Finland). *Acta Chir. Scand.* 137(6):563-568, 1971.

Mechanical ileus of the large and small intestines was induced in male Sprague-Dawley rats and the 5-hydroxytryptamine (5-HT) content of the intestinal wall above and below the site of the obstruction was assayed. Controls were subjected to a sham operation. Duodenal ileus significantly reduced the 5-HT content of the obstructed area within 17 hr, while in the terminal ileum significant decrease in intestinal 5-HT occurred 4 days after the obstructing operation. In mechanical ileus of the proximal colon, the 5-HT content above the site of obstruction decreased between the third and fifth day; in the distal colon 5-HT content decreased between the sixth and twelfth day. There was no change noted in the 5-HT content of the intestine below the obstructive site in any area of the intestines. Possible reasons for the drop in 5-HT content during mechanical ileus may be increased liberation of 5-HT from argentaffin cells, decreased synthesis or both. The results suggest that increased peristalsis had less to do with 5-HT release than increased intraluminal pressure. 5-HT concentration was reduced only after intraluminal pressure increased and may reflect mucosal damage. The availability of tryptophan, cupric ions, and ascorbic acid may be factors in the lack of biosynthesis of 5-HT.

9944 EFFECT OF OCTAPEPTIDE OF CHOLECYSTOKININ ON CANINE PYLORIC PRESSURE. (E.) Isenberg, J. I. (Wadsworth Gen. Hosp., Los Angeles, Calif.) add A. Csendes. *Am. J. Physiol.* 222(2):428-431, 1972.

Mongrel dogs were prepared with a Thomas cannula in the stomach 6-8 cm proximal to the gastroduodenal junction, and a second Thomas cannula in the duodenum, 12-15 cm distal to the gastroduodenal junction. Dogs were rested for 4 weeks before studies in which open-tipped polyvinyl tips perfused with water by a syringe pump were used as sensors. These pressure sensors were moved in 1-cm increments and at 15-sec intervals across the pylorus. Studies were performed with i.v. infusion of saline (control) or the C-terminal octapeptide of cholecystokinin (0.25, 0.5 and 1.0 μg/kg-hr, on separate days). When the sensors were moved from the stomach to the duodenum, the mean resting pressure of the pyloric sphincter ranged from 12.0-19.4 cm H_2O, while, when it was moved from the duodenum to the stomach the pressure ranged from 4.2 to 14.1 cm H_2O. The zone of increased pressure occurred at the same site with movement in either direction, and the mean stomach-to-duodenum pressure was greater than the mean duodenum-to-stomach pressure. There were many more pull-throughs with zero pressure with movement of the sensors from duodenum to stomach than in the other direction. In all studies, the pyloric zone of increased pressure occurred at the same time as the change in potential. Significant changes in pyloric pressure were seen only with the 2 higher doses of the octapeptide with stomach-to-duodenum movement and only with the highest dose in the other direction. With movement in both directions, increasing doses of the octapeptide produced a stepwise increase in the percentage of pull-throughs with a definite zone of increased pressure.

9945 EFFECTS OF HIGH-ALTITUDE EXPOSURE ON RATE OF INGESTA PASSAGE IN RATS. (E.) Krabill, L. F. (Fitzsimons Gen. Hosp., Denver, Colo.) and J. P. Hannon. *Am. J. Physiol.* 222(2): 458-461, 1971.

Polyethylene glycol was used as a marker to measure intestinal transit time in Sprague-Dawley rats. One group was exposed to high altitude (14,110 feet) and fed ad libitum on a meal-eating schedule. The second group was maintained at low altitude (5,280 feet) and was pair-fed to the first group. A third control group was also maintained at low altitude (5,280 feet) and was fed ad libitum. Exposure to high altitude (1-8 days) was accompanied by an increased intestinal transit time, reduced food intake, decreased efficiency of food utilization and suppression of growth. The changes seen at high altitude increased in severity with increasing duration of exposure.

9946 CINERADIOGRAPHIC STUDIES OF GASTRIC MOTILITY IN TURKEYS. (E.) Dziuk, H. E.

(U. Minnesota Coll. Vet. Med., St. Paul) and G. E. Duke. *Am. J. Physiol.* 222(1):159-166, 1972.

Direct observation and cineradiography were used to study gastric motility in the stomachs of turkeys. There were 6 phases of rhythmic contractions of the muscular stomach, and these correlated with contractions of the glandular stomach and duodenum. The first phase lasted 4 sec and consisted of the onset of thin muscle contraction, completion of thick muscle contraction and closure of the gastric isthmus. During the second phase (4 sec) there was relaxation of thick muscles, maximal contraction of thin muscles, onset of thin muscle relaxation and opening of the pylorus with onset of flow of ingesta from the muscular stomach to the duodenum. The third phase (2 sec) was characterized by onset of thick muscle contraction; closure of the pylorus, with cessation of flow of ingesta from the muscular stomach to the duodenum; contraction of the duodenum; opening of the gastric isthmus; reflux of ingesta from the muscular stomach to glandular stomach; cessation of thin muscle contraction. During Phase Four (2 sec) there was: continuation of thin muscle contraction and relaxation of thin muscles. Phase Five (12 sec) consisted of continuation of thick muscle contraction; onset of contraction of glandular stomach beginning at the esophageal end; flow of ingesta from glandular stomach to cranial dorsal sac of muscular stomach; onset of relaxation of thick muscles; completion of contraction of glandular stomach. A sixth phase of relaxation occurred only infrequently and at irregular intervals.

9947 GASTRIC PRESSURE AND SMOOTH MUSCLE ELECTRICAL POTENTIAL CHANGES IN TURKEYS. (E.) Duke, G. E. (U. Minnesota Coll. Vet. Med., St. Paul), H. E. Dziuk and O. A. Evanson. *Am. J. Physiol.* 222(1):167-173, 1972.

Turkeys were prepared with a cannula placed in the proximal duodenum through a fistula and either 1 or 2 pairs of electrodes implanted in the thick caudodorsal and/or thin caudoventral muscles of the muscular stomach. The pressure record from the glandular stomach was characterized by a large positive wave representing the pressure increase during contraction of this organ. This large wave was preceded by smaller waves caused by the reflux of ingesta from the muscular stomach during the contraction of the thick muscles. The pressure record from the muscular stomach was generally composed of 2 major pressure waves per gastric cycle; the first was due to contraction of the thin muscles; the second, to contraction of thick muscles, and these 2 waves varied in magnitude. There was usually a rise in pressure which began in the glandular stomach just before the maximal pressure rise associated with contraction of the thick muscles was reached; the latter started to cease before the former. Elevated pressures began in the upper proximal duodenum after the maximal pressure associated with contraction of the thin muscles was reached and lasted until the next cycle. Elevated pressures in both parts of the stomach and duodenum were usually correlated and their frequencies were nearly equal. The mean magnitude of pressure change as a result of contraction decreased in the following order : thick muscles, thin muscles, glandular stomach and duodenum. Pressures within the glandular stomach ranged from 4-310 mm Hg, but pressures higher than 100-125 mm Hg were seldom observed. Mean peak pressures due to contraction of the glandular stomach and to thin and thick muscles of the muscular stomach were 24, 24 and 35 mm Hg, resp, and the mean duration of pressure rises was 7.3, 5.6 and 9.4 sec, resp.

9948 EFFECTS OF 5-HYDROXYTRYPTAMINE ON ISOLATED STRIPS OF THE GUINEA-PIG STOMACH. (E.) Yamaguchi, T. (Kyushu U. Fac. Med., Fukuoka, Japan). *Br. J. Pharmacol.* 44(1): 100-108, 1972.

The effects of 5-hydroxytryptamine (5-HT) on isolated strips of longitudinal and circular muscle of the guinea pig stomach showed that the resting tension of the longitudinal muscle was increased (contraction) while that of the circular muscle was decreased (relaxation). These effects were blocked by lysergic acid diethylamide (LSD), but were not affected by tetrodotoxin, hyoscine, or morphine. In both muscle layers, 5-HT potentiates the contractions in response to electrical stimulation. It seems that 5-HT either potentiates the release of transmitter or increases muscle sensitivity. In the isolated intact stomach, 5-HT caused either a reduction in intraluminal pressure or a diphasic response. It was postulated that in the intact stomach 5-HT could not reach the smooth muscle or there may be an interaction between longitudinal and circular muscles, or detection of pressures may not be sensitive enough, thus explaining the variable response in the entire stomach. Nervous elements may have spontaneous activity only in the intact stomach therefore requiring electrical stimulation for the detection of M receptors in isolated strips. The sphincter antri seems to be poorly innervated and to possess few D receptors.

9949 ADRENERGIC AND CHOLINERGIC RECEPTORS OF INTESTINAL VILLI IN DOGS. (E.) Kokas, E. (U. North Carolina Sch. Med., Chapel Hill) and H. A. Gordon. *J. Pharmacol. Exp. Ther.* 180(1):56-61, 1972.

The contractions of the villus field to alpha and beta agonists and blockers was studied in the intestinal mucosa of 25 dogs. The dogs were anesthetized with phenobarbital sodium and gastric juice, endogenous villikinin, and mucus was removed from the field of study. A "collar" of mucus allowed topical application of the drugs and the observation of the villi by a stereoscopic microscope. It was found that alpha agonists (norepinephrine or phenylephrine) stopped villous activity, while a beta agonist (isoproterenol) enhanced activity. The alpha adrenergic blocker, phentolamine, antagonized the effects of norepinephrine while the beta blockers, propranolol and dichloroisoproterenol antagonized the effect of isoproterenol. L-Epinephrine, and alpha agonist or a beta agonist according to dose, depressed (alpha) or stimulated (beta) villus activity. Inhibition was predominant at dosage of 100 mg/ml. Epinephrine stimulated villus activity after pretreatment with phentolamine while after pretreatment with propanolol, epinephrine inhibited activity. Combined phentolamine and propranolol pretreatment prevented both effects by epinephrine. Cholinergic agents increased motility. These results were compared to previously reported effects of these agents on the motility of the tunica muscularis.

9950 EXCITATION OF INTESTINAL MUSCLE BY ATROPINE, TETRODOTOXIN, AND XYLOCAINE. (E.) Wood, J. D. (Williams Coll. Dept. Biol., Williamstown, Mass.). *Am. J. Physiol.* 222(1): 118-125, 1972.

Sections from the first 12-15 cm of jejunum caudal to the ligament of Treitz were removed from cats under anesthesia. Isolated segments not used immediately were refrigerated in Tyrode solution at 5-8°C without aeration; if tissue was stored for more than 1 day, the solution was replaced daily with fresh 5-8°C Tyrode solution previously aerated with 95% O_2-5% CO_2. Both transverse strips and intact segments of intestine were used in these in vitro studies. In all control preparations, there were seen to be low levels of mechanical activity of the circular muscle, electrical slow waves of longitudinal muscle and absence of action potentials of the circular muscle. Increased amplitude of contraction of circular muscle and the production of action potentials accompanied exposure to atropine procaine, lidocaine and tetrodotoxin; this activity was suppressed by high concentrations of lidocaine. After storage at 5°C for 7 days, there was no excitatory response to atropine or lidocaine, except at high concentrations of the latter. After this period of storage, excitation was seen with $BaCl_2$. Transmural electrical stimulation inhibited the atropine-induced circular muscle activity; this inhibition was abolished by lidocaine, procaine and tetrodotoxin, but not by guanethidine. After blockade of enteric neurons, conducted responses to mechanical stimulation were more easily elicited and were propagated over longer distances. The data suggest that excitation of the circular muscle by muscarinic blocking agents and local anesthetics is indirect and may result from an action of these agents on the enteric nervous system.

9951 MOTILITY-INDUCING FACTORS IN ALIMENTARY TRACT SOLUTIONS. (E.) Schofield, G. C. (Monash U. Dept. Anat., Clayton, Victoria, Australia), A. J. Bond, A. M. Atkins and N. G. M. Wreford. *Gastroenterology* 62(2):268-274, 1972.

In vitro preparations were made using 5-cm segments of ileum, from a point 12-25 cm from the ileocecal junction in guinea pigs and rabbits and from 50-200 cm from this junction in pigs and sheep. Test solutions (secretions or dialysates of tissue) were obtained from various areas of stomach, duodenum, jejunum, ileum and colon and from human saliva. Vigorous and sustained contractions of these in vitro loops were produced by perfusion with substances from solutions of isolated duodenum (guinea pig, rabbit, sheep, pig), pyloric antrum of rabbits and human saliva. The molecular weight of this substance(s) was 1000 to 10,000. This motility-inducing activity was resistant to heating of the factor(s) to 55°C for 5 min; incubation at pH 2 or pH 11 for 1 hr at 37°C followed by readjustment to pH 8.0; and incubation for 30 minutes at 37°C with 20 µg/ml of trypsin or pepsin. These ultrafiltrates were inactivated after heating to 100°C for 5 min or after incubation for 30 min at 37°C with 20 µg/ml of pronase.

9952 STATISTICS OF CONTRACTIONS AT A POINT IN THE HUMAN DUODENUM. (E.) Christensen, J. (VA Hosp., Iowa City, Iowa), J. R. Glover, E. O. Macagno, R. B. Singerman and N. W. Weisbrodt. *Am. J. Physiol.* 221(6):1818-1823, 1971.

Pressure peaks from the third part of the duodenum were studied in 9 healthy volunteers who swallowed a bundle of 4 water-filled polyvinyl tubes (1 mm internal, 2 mm external diameter), each containing a distal terminal plug and a distal lateral opening 1 mm in diameter. These openings were 1 cm apart and each was covered by a latex rubber sleeve. Subjects were fasted 12-18 hr before intubation and control values were obtained. Thirty min after intubation, each subject drank 1 pint of skim milk and records were made for 60-120 minutes. The computer management of the recorded data is discussed. Pressure peaks on adjacent channels were found to be independent, meaning that the physical length of the contractions producing these pressure peaks can be less than 2 cm. Peaks and valleys tended to occur with a regular periodicity of 5 min. A single contraction cycle was most often followed by a single rest cycle, less often by 2, still less often by 3, and so on. There was little cross-correlation between the numbers of contraction cycles in any series and the numbers of rest cycles in the following series of rest cycles. The patterns of occurrence of sequential contraction and rest cycles favor groups of 1-2 contraction cycles (accounting for 95%), followed by 1-13 rest cycles (account for 95%). In the 9 subjects the proportion of slow-wave cycles varied from 14-33.6% (mean 2.51%).

9953 EFFECTS OF GASTRIC DISTENTION ON ACTIVITY OF ABDOMINAL MUSCLES IN DOGS. (E.) Tong, E. Y. (U. Wisconsin Dept. Physiol., Madison) and D. T. Tjioe. *Am. J. Physiol.* 221(6):1652-1656, 1971.

In this study, tone of abdominal muscles was studied in mongrel dogs who had received sodium pentobarbital (20-23 mg/kg, i.v.). With inflation of an intragastric balloon, there was a decrease in muscular activity of both the external oblique and rectus abdominis muscles; activity could be abolished with sufficient intragastric pressure. The mean latent period between gastric distention and abdominal muscular relaxation was 1 sec. In another group, the elevation in intra-abdominal pressure caused by external pressure (bandaging) was much higher than that caused by gastric distention, but the inhibition of steady-state contractions in the external oblique was usually much greater with increased intragastric pressure. Complete deafferentation by cervical vagotomy and either chronic or acute abdominal sympathectomy showed that the afferent fibers for the gastroabdominal reflex are contained in the thoracolumbar system. The reflex inhibition of abdominal muscular tone was abolished following splanchnicotomy and abdominal sympathectomy either alone or after vagotomy, and was not prevented by vagotomy alone. The effect of increased intraabdominal pressure was to augment the inhibition of abdominal muscular tone caused by gastric distention.

9954 CIRCADIAN RHYTHM OF CELLULAR DYNAMICS IN THE GASTRIC MUCOSA (FUNDUS AND PYLORIC REGION) IN TERMS OF THE NERVOUS SYSTEM TYPE IN RATS WITH TIME-CONDITIONED ALIMENTARY REFLEX. (E.) Bălan, M. (Acad. Med. Sci. Inst. Public Health, Iasi, Rumania) and L. Marza. *Rev. Roum. Embryol. Cytol.* 8(1):107-122, 1971.

Specimens of gastric fundus and pylorus of male rats were studied with respect to cellular dynamics in terms of the animals' emotional disposition and time-conditioned alimentary reflex. Rats were classified as: choleric (strongly unbalanced), sanguine (strongly unbalanced, mobile), phlegmatic (balanced, inert) or weak. The index of cellular proliferation was higher in the choleric and sanguine rats than in the phlegmatic and, to an even greater extent, the weak types. The renewal of cells in the glandular neck was found to exhibit nyctohemeral variations depending on the time conditioned-reflex.

9955 EFFECTS OF SOME DRUGS ON ELECTRICAL ACTIVITY OF THE ISOLATED COLON OF THE CAT. (E.) Wienbeck, M. and J. Christensen (U. Iowa Coll. Med., Iowa City). *Gastroenterology* 61(4, Pt. 1):470-478, 1971.

The effects of autonomic drugs and drugs known to influence colonic motility on slow wave frequency and duration and on spike activity were studied in the isolated circular muscle of 43 cat colons. Untreated control colons showed slower, longer and more variable slow wave frequencies proximally rather than distally. Anticholinergic agents such as atropine reversed the cholinergic effects of prolonged slow wave duration and enhanced spike activity. Adrenergic agonists such as norepinephrine and epinephrine inhibited spike activity at high concentrations and had only slight reducing effects on slow wave frequency or increasing effects on spike activity at lower concentrations. Low concentration spike excitation was inhibited by phenoxybenzamine and the high concentration spike suppression was inhibited by isoproteronol and phenoxybenzamine. Isoproterenol reduced slow wave duration, suppressed spike activity and was opposed by propanolol. Serotonin markedly prolonged slow wave duration, increased spike activity throughout the entire colon and was antagonized by methysergide. Slow waves in the proximal colon were prolonged and spike activity increased with morphine and ouabain reduced the amplitude and frequency of slow waves at low concentrations. Such ganglionic stimulants as nicotine, dimethylphenylpiperazinium iodine and hexamethonium had no effect on the slow wave frequency, duration or incidence of spike activity. Colon slow wave frequency, duration and spike activity are labile and can be influenced by autonomic and other drugs. With the exception of morphine and serotonin there appear to be no major differences in the electric response to these various drugs from the ascending to sigmoid colon.

9956 EXPERIMENTAL STUDY ON CHANGING MOTILITY IN THE LARGE INTESTINE BY XANTHINOL NICOTINATE AND HYPEROSMOTIC SOLUTIONS IN OBSTRUCTIVE ILEUS. (Ger.) Willmen, H.-R. (Tech. U. Med. Sch., Aachen, Germany), G. Zlatarski, F. K. Lynen, S. Langer and H. Heinze. *Med. Welt* 22(36):1378-1381, 1971.

Injections (i.v.) or infusions of a solution of xanthinol nicotinate or a hyperosmotic solution containing 10% xanthinol nicotinate + 20% sorbitol had no effect on intestinal motility when administered to dogs during the first 24 hr after surgical induction of obstructive ileus by ligation of the sigmoid. Between 24 and 48 hr after surgery both xanthinol nicotinate and its hyperosmotic solution increased intestinal motility to the same extent; after 48 hr the hyperosmotic solution was more effective. It was demonstrated that both xanthinol nicotinate and the hyperosmotic solution significantly increased intestinal blood flow proximal to the ligation within 1-2 min and increased intestinal motility and the surface area of the intestine during peristalsis. On the basis of these findings and preliminary clinical trials, xanthinol is recommended for the treatment of obstructive ileus.

9957 COMPUTER ANALYSIS AND SIMULATION OF HUMAN GASTRODUODENAL ELECTRICAL ACTIVITY.

(E.) Brown, B. H. (Univ. Dept. Surg., Sheffield, England), K. K. Ng, K. Kwong, H. L. Duthie, G. E. Whittaker and C. I. Franks. *Med. Biol. Eng.* 9(4): 305-314, 1971.

The nature of the electrical conduction in both the pyloric antrum and upper half of the duodenum was studied by simultaneously recording potentials (4-6 chronically-implanted stainless steel electrodes) from both regions in 10 patients and using cross-correlation techniques. Gastric electrical activity was conducted down the pyloric antrum, across the pyloric ring and along part of the duodenum at a frequency of 3/min. The dominant electrical activity of the duodenum was at a frequency of 12/min; however, a loose link between the two dominant activities at 3 and 12/min is possible. Whereas the duodenal activity showed no consistent direction of transmission, the gastric activity was conducted only in the aboral direction. Thus the pyloric ring is not a barrier to the passage of gastric electrical activity; and the basic electrical activity from the upper third of the duodenum is not conducted as a wave, but is consistent with the area being a pacemaker which may be modelled by a series of relatively tightly linked relaxation oscillators.

9958 EFFECT OF PROSTAGLANDIN E_1 ON INTESTINAL MOTILITY OF THE CAT.

(E.) Türker, R. K. (Cleveland Clin., Ohio) and R. Onur. *Arch. Int. Physiol. Biochim.* 79(3):535-543, 1971.

The effect of prostaglandin E_1 (PGE_1) on the ileal motility of cats was studied in situ in adrenalectomized animals and in vitro. In situ, close-arterial perfusion of prostaglandin E_1 produced an inhibition of intestinal motility in 12 of 15 animals (80%) and an excitation in 3 (20%). Dihydroergotamine (2 mg/kg i.v.) did not alter the inhibitory effect of PGE_1. Prostaglandin E_1 increased the intestinal inhibitory effect of exogenously applied norepinephrine by 45%, but did not influence its pressor action. Guanethidine (5 mg/kg i.v.), atropine (2 mg/kg), mepyramine (2 mg/kg) and methysergide (1 mg/kg) had no influence on the effect of the prostaglandin in situ. In vitro, PGE_1 induced an increase in intraluminal pressure of the ileum in 8 of 11 experiments. Further injection of the lipid did not influence the intraluminal pressure but did cause a decrease in ileal motility. As with the in situ studies, the decrease in perfusion pressure was dose-dependent. Dihydroergotamine (2 mg/ml) did not influence the effect of prostaglandin E_1 in vitro.

9959 ROLE OF THE SYMPATHETIC NERVOUS SYSTEM IN RETROPERITONEALLY-INDUCED INTESTINAL PARALYSIS. A HISTOCHEMICAL STUDY OF ADRENERGIC TERMINALS IN THE RAT.

(E.) Lindquist, B. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 137(5): 459-462, 1971.

The sympathetic flow in the intestinal wall and mesenteric blood vessels was studied in adult male rats with severe retroperitoneal irritation using histochemical fluorescence. Immediately after induction of severe retroperitoneal irritation there was an increase in the intensity of the fluorescence. Twenty-four hours after induction of the retroperitoneal irritation, the fluorescence intensity was reduced and essentially the same as that found in the control animals. Similar results were seen in the intestinal wall and the mesenteric blood vessels. The intestinal paralysis which follows retroperitoneal irritation appears to be mediated by the sympathetic nervous system, showing the greatest retardation immediately after irritation.

9960 RELATIONSHIP BETWEEN CHRONIC VAGAL DENERVATION AND THE RESPONSE OF THE ISOLATED RAT ILEUM TO NICOTINE.

(E.) Goldenberg, M. M. (Norwich Pharm. Co., N. Y.). *Arch. Int. Pharmacodyn. Ther.* 192(2):353-361, 1971.

The abdominal vagi of rats were excised and allowed to degenerate for 3-6 weeks before use and did not affect the biphasic contractile response of the ileum to acetylcholine and nicotine in vitro as compared to normal ileum. DMAE (α,α'-bis (dimethylammonium-acetaldehyde diethylacetal)-p,p'-diacetylbiphenyl bromide), cocaine and strychnine caused considerable inhibition of the biphasic contractile response of the chronic vagally-denervated rat ileum to nicotine, while the response to acetylcholine was not significantly changed. Atropine abolished the primary spike-like contraction to nicotine, had no effect on the secondary slow contraction and completely inhibited the biphasic contractile response to acetylcholine. Hexamethonium elicited only partial inhibition of the primary contraction to nicotine but in combination with atropine caused a marked reduction in the primary response and a lesser reduction in the secondary response to nicotine. DMAE and hexamethonium in combination evoked greater antagonism of the biphasic contractile response of the denervated ileum to nicotine than either drug used alone and both failed to inhibit the response to acetylcholine. Histochemically, a section of ileum revealed a decrease in amount of acetylcholinesterase-containing intrinsic neuronal fibers as well as a decrease in density of staining around Auerbach's and Meissner's plexuses. The contractile action of nicotine on the chronic vagally-denervated rat ileum does not appear dependent upon intact preganglionic cholinergic nerve fibers innervating the ileum.

9961 A COMPARISON OF THE SITE OF ACTION OF GASTRIN I ON LOWER ESOPHAGEAL SPHINCTER AND ANTRAL CIRCULAR SMOOTH MUSCLE.

(E.) Lipshutz, W., A. F. Tuch and S. Cohen (U. Pennsylvania Hosp., Philadelphia). *Gastroenterology* 61(4, Pt. 1):454-460, 1971.

Using 20 adult opossums, it was found that atropine, hyoscine, tetrodotoxin and hemicholinium significantly inhibited the maximal response of circular muscle of both the lower esophageal sphincter and antral smooth muscle to gastrin I. Other antagonists such as hexamethonium, phentolamine, diphenhydramine and propanolol that normally produce near maximum-antagonism of the response to their natural antagonists, did not alter the response to gastrin I. Physostigmine potentiated the response to gastrin I on the circular muscle of both antrum and lower esophageal sphincter. Gastrin I appears to act on the same site on the circular smooth muscle of both these sites by stimulating the release of acetylcholine from postganglionic cholinergic nerves and may effect dissimilar responses in the circular muscles by its differing ability to release acetylcholine at each region.

9962 THE DUODENAL PACEMAKER AND ITS ROLE IN THE ORGANISATION OF DUODENAL ACTIVITY. (E.) Hermon Taylor, J. (London Hosp.). *J. R. Coll. Surg. Edinb.* 16(5):268-270, 1971.

9963 SOME OBSERVATIONS ON GASTRIC ACTIVITY IN ADULT ALSATIAN DOGS. (E.)

Currer Briggs, R. A. and I. McLeish. *J. R. Army Vet. Corps* 42:6-8, 1971.

9964 ELECTRICAL ACTIVITY OF GUINEA PIG TAENIA COLI IN CALCIUM LOCKE SOLUTION.

(E.) Sakamoto, Y. (Kyushu U. Sch. Dent., Fukuoka, Japan). *Jap. J. Physiol.* 21(3):295-306, 1971.

9965 A COMPARATIVE STUDY OF ESOPHAGEAL MOTILITY IN DIABETICS WITH NEUROPATHY.

(E.) Horgan, J. H. (St. Laurence's Hosp., Dublin, Ireland) and J. S. Doyle. *Chest* 60(2):170-174, 1971.

9966 OBJECTIVE EVALUATION OF AN ANTACID WITH UNUSUAL PROPERTIES. (E.) Beckloff, G. L. (Marion Labs. Inc., Kansas City, Mo.), J. H. Chapman and P. Shiverdecker. *J. Clin. Pharmacol.* 12(1):11-21, 1972.

Radiographic techniques and intragastric pH measurements in normal subjects confirmed the effectiveness of an antacid tablet formulation containing alginic acid, sodium bicarbonate, aluminum hydroxide, and magnesium trisilicate in producing a viscous neutralizing gel which floats upon the stomach contents. Hence, with reflux, the material which first contacts the esophageal mucosa is the antacid gel. After administration of the test antacid, a roentgenogram demonstrated a foam or frothy layer remaining in the cardia of the stomach as the liquid barium mixture was being emptied. The intragastric pH was elevated to values near 5.8; an alkaline intragastric pH was demonstrated throughout the 180-min testing period. If the antacid is administered on an empty stomach, particularly just before retiring, it is possible that the protecting antacid foam may be present near the gastroesophageal junction for varying periods of time while the patient slept.

9967 INTERACTION OF STIMULANTS OF ACID SECRETION IN CAT. (E.) Dinbar, A. and M. I. Grossman (VA Ctr., Los Angeles, Calif.). *Gastroenterology* 62(2):242-246, 1972.

In cats with gastric fistulas, the observed highest responses to histamine alone or pentagastrin alone were not different. The observed highest response to all pairs (histamine plus gastrin, histamine plus pentagastrin) except histamine plus bethanechol were greater than to histamine or pentagastrin alone. However, the calculated maximal responses to single stimulants and to pairs did not differ significantly. Potentiation should be defined as response to pairs of stimulants greater than calculated maximal response to either stimulant singly and, as such, potentiation of acid secretion has been demonstrated only in dogs.

9968 SECRETIN AND CHOLECYSTOKININ/PANCREOZYMIN IN COMBINATION IN THE INHIBITION OF GASTRIC ACID SECRETION. (E.) Bedi, B. S. (Western Infirm., Glasgow, Scotland), H. T. Debas, A. E. O. Wasunna, B. F. Buxton and I. E. Gillespie. *Gut* 12(12):968-972, 1971.

The effect of simultaneous administration of secretin and cholecystokinin/pancreozymin on gastric acid secretion was studied in 3 dogs with Heidenhain type fundic pouches. When secretin was infused alone (75 clinical U/hr), the inhibition of acid secretion occurred within 15 min and was maintained for 105 min. Seventy-five clinical U of cholecystokinin infusion over 1 hr caused a significant reduction of the acid response to pentagastrin for 90 min. When the smallest doses of secretin (19 clinical U) and of cholecystokinin (37.5 clinical U), which separately showed significant inhibition of the acid response to maximal doses of pentagastrin were infused simultaneously, the degree of inhibition was not significantly different from that from twice the dose of either agent given separately. When subthreshold doses, i.e. 9 U of secretin and 19 U of cholecystokinin were infused together, the degree of inhibition was greater than the inhibition by twice the dose of either agent alone, indicating a potentiation.

9969 ATROPINE-INDUCED INHIBITION OF GASTRIC SECRETION STIMULATED BY EXOGENOUS OR ENDOGENOUS GASTRIN IN THE RAT. (Fr.) Nasca, S. (Bichat Hosp., Paris), M. Dubrasquet, A. Bonnefond and S. Bonfils. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):333-338, 1971.

Following stabilization of the secretion of gastric HCl in intact rats receiving pig gastrin by i.v. perfusion (by way of the jugular vein), the amount of such secretion was inhibited 20-40% by i.v. administration of atropine (12.5-500 µg per kg). The degree of inhibition achieved was independent of the dosage of atropine. In rats undergoing transposition of the antrum into the colon, secretion of gastric HCl stabilized at a level which was 3-4 times greater than control levels. In these animals the secretion of gastric HCl was inhibited by 0-100% by s.c. administration of atropine at the same dose levels as above. The phenomenon was directly dose-related, as was the duration of this atropine effect. It was concluded that rats bearing such transpositions provide an excellent test system for the pharmacologic study of inhibitors of gastric secretion.

9970 STIMULATION OF GASTRIC ACID AND PEPSIN SECRETIONS IN THE DOG BY SLOW INTRAVENOUS ADMINISTRATION OF 2-DDG. (Fr.) Mignon, M. (Bichat Hosp., Paris), V. Varro, J. Vatier and S. Bonfils. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):317-324, 1971.

In fasting dogs bearing gastric fistulae, slow i.v. perfusion of 2-deoxy-D-glucose (50 or 100 mg/kg in 3 hr) induced high secretory levels of HCl and pepsin, in terms of volume and concentration. These were maintained throughout the entire perfusion and subsided only slowly thereafter, confirming a state of prolonged stimulation of the vagus. The responses were clearly dose-related. Increase of the dose to 150 mg/kg in 3 hr resulted in a fading effect, which was more marked for HCl than for pepsin and was characterized by inability to maintain the maximal response to the end of the perfusion period. Rapid i.v. injection of comparable doses induced only transient stimulation, peaking at 30 min and subsiding rapidly thereafter. In animals receiving only 100 μg/kg in 3 hr, the maximal stimulatory effect was prolonged over a period of 4 hr.

9971 PEPSIN STIMULATED BY TOPICAL HYDROCHLORIC AND ACETIC ACIDS. (E.) Johnson, L. R. (U. Oklahoma Med. Ctr., Oklahoma City). *Gastroenterology* 62(1):33-38, 1972.

The effect of noninjurious and damaging amounts of HCl and acetic acid on pepsin secretion was studied in 4 dogs with vagally-denervated pouches of the oxyntic gland area. Relatively high concentrations of HCl were used to increase the diffusion gradient for H+, thereby causing a flux of H+ through the normal mucosa approximately equivalent to what would be expected if the barrier had been broken by an extraneous agent such as alcohol, acetic acid, or aspirin. Pepsin secretion was directly proportional to the concentration of acid placed in the pouches for 100, 200 and 250 mN HCl, the latter 2 causing rises in pepsin output of 40% and 75%, resp, over control levels obtained during irrigation with 100 mN HCl. At 300 mN HCl, the pepsin output was 300% that of control levels. Pepsin secretion was directly related to the net flux of H^+ out of the pouch. Irrigation of the pouches with 100 mN acetic acid caused a 3-fold increase in pepsin output over control periods before and during acetic acid infusion. Following acetic acid irrigation, 100 mN HCl caused a further rise in pepsin secretion indicating that the barrier to ion diffusion had been disrupted by the acetic acid. The i.v. infusion of 100 μg atropine/kg/hr for the duration of the experiment blocked the increase in pepsin secretion in response to acetic acid but did not affect the ability of acetic acid to damage the mucosal barrier.

9972 THE METABOLISM OF ETHANOL TO CARBON DIOXIDE BY STOMACH AND SMALL INTESTINAL SLICES. (E.) Carter, E. A. (Harvard Med. Sch., Boston, Mass.) and K. J. Isselbacher. *Proc. Soc. Exp. Biol. Med.* 138(4):817-819, 1971.

Alcohol dehydrogenase (ADH) exists in the mucosa of the stomach and small intestines of male and female Sprague-Dawley rats. The ADH specific activity of the enzyme of the stomach was 3 times the activity of the liver; the small intestine and liver activity were equal. A microsomal ethanol oxidizing system could not be found in the gastrointestinal tissue. The capacity of the stomach or small intestine to convert ethanol to CO_2 was less than that of the liver. The upper intestine had a specific activity two-thirds of the liver activity; while the stomach, middle and lower small intestine had one-fifth the activity of the liver. Studies were conducted in germ-free animals to eliminate the effect of gastrointestinal bacterial flora; it was noted that oxidation to CO_2 was greater in the upper small intestine of germ-free animals. The effects of ethanol on transport mechanisms seem to be related to the metabolism of ethanol by the mucosa. The significance of these findings remains to be elucidated.

9973 REDUCTION OF ACIDITY IN THE GUINEA PIG BY PARTIAL DEVASCULARISATION OF THE STOMACH. (E.) Johnson, J. A. (Cent. Hosp., Tromso, Norway) and N. B. Fjeld. *Acta Chir. Scand.* 137(7):679-681, 1971.

The effect on the HCl output in 15 groups of 10 guinea pigs each was investigated by ligating the main vessels to the stomach. Ligation of the right gastric and gastroepiploic vessels produced no immediate effect on the acid output under basal conditions or during varying histamine stimulation. Recordings taken 3 weeks after ligation showed a reduction in relation to body weight of 50% when compared to controls. The ligation of the splenic vessels after maximal histamine stimulation yielded an acid output 44% less than the controls. Six weeks after ligation, values 33% less than control were recorded. Vagotomy with ligation increased the difference from 44% to 68%. During submaximal histamine stimulation with ligation of the left gastric vessel the acid output was 52% less than the controls. Six weeks after ligation the same acid output was recorded but on a greater weight basis. Maximal histamine stimulation caused the output to be 65% less; with vagotomy the difference was 73.5%. Ligation of the left gastric, right gastric and right gastroepiploic, during submaximal stimulation, had acid outputs 72% less than control. Maximal histamine stimulation gave a value of 76.5%; with vagotomy 79% less. The left gastric and splenic ligation gave values 88% less.

9974 CALCIUM AND GASTRIC SECRETION IN MAN. (Fr.) Passaro, E. (Wadsworth Hosp., Los Angeles, Calif.), N. Basso, G. Mennini, E. Lezoche and V. Speranza. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):339-344, 1971.

Four fasting patients who had undergone antrectomy and 3 who had undergone antrectomy and vagotomy received an i.v. infusion of calcium gluconate (16 mg/kg/hr for 4 hr, in isotonic saline). In both groups of patients, the secretion of gastric HCl peaked at 5 times the premedication level. In antrectomized-vagotomized patients, the peak came at the end of the second hr, followed by an earlier and considerably more rapid decline than was seen in the patients who had undergone antrectomy alone. In the presence of antrectomy alone, the peak was delayed for an additional 10-15 min, and levels of gastric HCl were higher throughout the entire observation period. It is concluded that antral gastrin and the preganglionic component of vagal innervation are not essential to the ability of calcium to induce gastric hypersecretion, suggesting a possible interaction between calcium and acetylcholine at a postganglionic level.

9975 THE RELATIONSHIP BETWEEN CONTROL LEVELS OF GASTRIC SECRETIONS AND SECRETIONS STIMULATED BY PENTAGASTRIN AND HISTAMINE IN EXPERIMENTAL ANIMALS. (It.) Basso, N. (U. Rome 2nd Surg. Clin.), C. J. Pfeiffer, E. Lezoche, J. A. L. Roth and V. Speranza. *Gazz. Int. Med. Chir.* 76(15):941-953, 1971.

In female ferrets bearing gastric fistulae, the secretion of HCl in response to pentagastrin was maximal after a single dose of 10 mg/kg i.p.; that of pepsin was maximal after 2 mg/kg i.p. In both instances, increasing the dose resulted in a dose-related, progressive decrease of the amount of secretion elicited. A significant, positive correlation was demonstrated between the degree of activity manifested in the resting state and the amount of increased secretion which could be elicited by the optimal stimulating dose as above. In all cases, secretory response to such an optimal dose was greater than that which was achieved in response to an optimal stimulating dose of histamine.

9976 DOSE RESPONSES WITH SUBCUTANEOUS INFUSION OF HISTAMINE IN GASTRIC FISTULA CHICKENS. (E.) Burhol, P. G. (U. Alabama Dept. Med., Birmingham) and B. I. Hirschowitz. *Am. J. Physiol.* 222(2):308-313, 1972.

A stainless steel cannula was implanted surgically in white leghorn chickens within the proventriculus well above the junction to the gizzard and animals were rested 5-23 weeks. At the time of the studies, after collection of basal gastric secretions, animals received s.c. infusion in saline for 150 min of histamine acid phosphate in doses of 75, 150, 300, 600 and 1,200 µg base/kg-hr (given in random order at 7-day intervals). The threshold dose of histamine for secretion was 150 µg base/kg-hr. The output of H^+, K^+, Cl^-, water and pepsin were dose-dependent and conformed to Michaelis-Menten kinetics. The mean Na^+ output showed no clear response to histamine during steady-state secretory conditions, while it did show a transient response to the 3 highest doses. The calculated S_{50} values for H^+, K^+, Cl^-, and water ranged from 148-164 µg/kg-hr while that for pepsin was 225 µg/kg-hr, but the latter did not differ significantly from the S_{50} for H^+; the S_{50} for Na^+ was only 90 µg/kg/hr.

9977 PENTOSE PHOSPHATE SHUNT AND GASTRIC ACID SECRETION IN THE RAT. (E.) Sernka, T. J. (San Francisco Gen. Hosp., Calif.) and J. B. Harris. *Am. J. Physiol.* 222(1):25-32, 1972.

Using stomachs of fasted albino rats, an in vitro preparation of the midglandular gastric mucosa was dissected free of its muscle and incubated in physiologic buffer. Endogenous substrates did not maintain the spontaneous secretion of acid by this isolated gastric mucosa. The secretory rate of mucosa exposed to 25 mM ribose was about 50% that of paired mucosa exposed to equimolar glucose. A rapid decline to zero secretion was seen with exposure to 25 mM pyruvate or butyrate, although both stimulated oxygen consumption while pyruvate also stimulated lactose production. When the role of the pentose phosphate shunt in the oxidation of glucose was studied, it was seen that the evolution of $^{14}CO_2$ from glucose-1-^{14}C was twice that from glucose with all the C labeled as ^{14}C and 4 times that from glucose-6-^{14}C. When the activity of pentose phosphate enzymes was assayed in the supernatant fraction of the mucosal homogenate, it was shown that the rate of oxidation through this shunt could account for 80% or more of the respiration of this preparation.

9978 GASTRIC SECRETORY RESPONSE TO PRESSURE ON VAGAL NUCLEI. (E.) Norton, L., E. Fuchs and B. Eiseman (Denver Gen. Hosp., Colo.). *Am. J. Surg.* 123(1):13-18, 1972.

Sixteen mongrel dogs were prepared with simple gastrostomy (4 animals), innervated gastric pouch (4) or pyloric fistula (8 animals). Inlying balloon pressure on the floor of the fourth ventricle produced an immediate, transient increase (mean 468% in first 30 min) in gastric acid secretion in 14 dogs. Cervical spinal cord transection obliterated sympathetic response to balloon inflation but did not alter hypersecretion in 2 dogs. Two vagotomized dogs did not show hypersecretion. The increased intracranial pressure in patients with severe head injury presumably is transmitted from the cerebrum through the brain stem to medullary vagal nuclei. Whether additional stimulation of the dorsal vagal nuclei due to pressure on the anterior hypothalamus plays a role in the hyperacidity of head injury is unknown.

9979 ENDOCRINE AND GASTRIC SECRETORY CHANGES INDUCED BY INCREASED INTRACRANIAL PRESSURE. (E.) O'Neill, J. A., Jr. (Louisiana State U. Med. Ctr., New Orleans), W. Booth, W. DeWeese, C. M. Johnson, D. G. Kline and F. C. Nance. *Am. J. Surg.* 123(1):19-24, 1972.

Five of 6 dogs who had inflation of an intracranial balloon in the right frontoparietal cortical area had a decrease in gastric volume and acid output ranging from 16-81%. Disappearance rates of glucose during glucose tolerance tests were normal and no dog was hypoglycemic at any time. Plasma cortisol levels were increased by 34% in dogs with diminished gastric secretory output. Arterial pressure blood gases, pH and pulse measurements were normal. All animals had compression necrosis beneath the right frontoparietal lobe, but none showed evidence of gastrointestinal ulceration. After induction of increased intracranial pressure in 4 dogs with antral pouches, the volume of mucus decreased; one of these dogs showed acute duodenal ulceration at autopsy. With decreased renewal of gastric mucus, any level of acidity may be responsible for mucosal damage seen with the complication of intracranial pathology known as Cushing's ulcer.

9980 EFFECT OF ACTH ON CANINE GASTRIC MUCUS. (E.) Dickson, G. H. (St. Mary's Hosp., London) and A. E. Thompson. *Digestion* 5(1):49-57, 1972.

The volume, weight and concentration of biochemical constituents of canine gastric mucus were measured before, during and after ACTH administration. Considerable spontaneous variation in the carbohydrate content of antral mucus was seen within each period. In contrast, the total nitrogen content remained reasonably constant. In only 4 of 50 statistical analyses were significant changes found between the ACTH phase and both saline phases. These were lowering of mucus secretion volume, a decrease in acetylhexosamine, an increased hexose and an increase in the carbohydrate: protein ratio. Each of these changes was confined to 1 dog and not repeated in the other 4. Since no uniform effect on the biochemistry of canine antral mucus was found, peptic ulceration occurring in conditions of stress may not be due to the action of ACTH on gastric mucus.

9981 EFFECT OF DUODENAL ACIDIFICATION OR EXOGENOUS SECRETIN ON GASTRIC ACID SECRETION STIMULATED BY HISTAMINE, PENTAGASTRIN OR HUMAN GASTRIN I IN CONSCIOUS CATS. (E.) Emås, S. (Gen. Hosp., Malmo, Sweden), S.-O. Svensson and I. Borg. *Digestion* 5(1):17-30, 1972.

Closure of the gastric fistula in cats with Heidenhain pouches did not produce any depression of pentagastrin or histamine-stimulated acid secretion from the Heidenhain pouch. Simultaneous gastric fistula closure and 1.8 mEq/hr HCl infusion did not alter pentagastrin or histamine-stimulated acid secretion. A rapid injection of 5 U of secretin/kg body weight reduced acid secretion from gastric fistula stimulated by submaximal doses of pentagastrin or human gastrin by 30% but was ineffective against histamine stimulated acid secretion. Physiological amounts of HCl entering the intact duodenum do not alter gastrin or pentagastrin-stimulated acid secretion from the Heidenhain pouches in conscious cats.

9982 THE STRUCTURE OF PIG GASTRIC MUCUS. CONFORMATIONAL TRANSITIONS INDUCED BY SALT. (E.) Snary, D. (Univ. Dept. Biochem., Newcastle-upon-Tyne, England), A. Allen and R. H. Pain. *Eur. J. Biochem.* 24(1):183-189, 1971.

The behavior of the 2 major mucoprotein components of a water-soluble extract of hog-gastric mucus was studied in aqueous KCl solutions of various concentrations. When unfractionated, water-soluble mucus extract was studied, the viscosity values underwent sharp changes between 0 and 0.05 M KCl and between 0.5 and 1.5 M KCl. The first change was attributed to a polyelectrolyte charge-shielding phenomenon. Whereas both the 18.7S and 4.9S mucoprotein components of the mucus both underwent a marked change in hydrodynamic properties in the range of 0.2 M KCl and 2.5 M KCl, neither showed any alteration in molecular weight in this concentration range. A marked increase in asymmetry accompanied by reduced solvation of the mucoproteins accounted for a large decrease in the ratio $K_S/ (\eta)$ (where $K_S = (1/5^\circ)\ (ds/dc)$ and (η) is the intrinsic velocity at zero shear stress. At concentrations above 3 mg/ml, the viscosity at zero shear of the 18.75 mucoprotein became abnormally high, reflecting the ability of mucus to form a gel structure under physiological conditions.

9983 THE INFLUENCE OF ACID, FAT, SECRETIN AND CHOLECYSTOKININ ON THE PENTAGASTRIN AND HISTAMINE STIMULATED ACID SECRETION IN THE RAT. (Ger.) Schmidt, H. A. (Med. Clin. University Marburg/Lahn, Germany), F. Johannson and H. Goebell. *Z. Gesamte Exp. Med.* 156(1):23-33, 1971.

In urethan-anesthetized, perfused female Wistar rats, gastric secretion was stimulated by slow i.v. infusion of pentagastrin (60 μg/hr) or histamine dihydrochloride (300 μg/hr). Intraduodenal administration of acid at pH 1.5-5-4.0 had no effect on the secretory level while pure oleic acid, olive oil and cream (25% fat) caused 23.9%, 23.0% and 20.0%, inhibition, resp., of the stimulated gastric secretion 10-20 min after administration. Values returned to initial levels 30 min after removal of the fats. Secretin by i.v. infusion also caused a 24% inhibition of the pentagastrin-stimulated acid secretion, which returned to initial levels 30 min after the discontinuation of secretin. Cholecystokinin by i.v. infusion caused a 30% increase in the submaximally stimulated gastric secretion, and alone in high dosages, stimulated acid secretion to about the same degree as pentagastrin similarly administered. It is suggested that the response of the rat to cholecystokinin, which differs from that of cat, man or dog, is species specific.

9984 PROPERTIES OF SOLUBLE ATPASE OF GASTRIC MUCOSA. II. EFFECT OF HCO_3^-. (E.) Blum, A. L., G. Shah, T. St. Pierre, H. F. Helander, C. P. Sung, V. D. Wiebelhaus and G. Sachs (U. Alabama Dept. Chem., Birmingham). *Biochim. Biophys. Acta* 249(1):101-113, 1971.

An ATPase was solubilized from fresh dog gastric mucosa. The highest specific activity of the ATPase and the highest percentage stimulation by HCO_3^- was obtained in the crude, smooth microsomal fraction. Solubilization increased the degree of HCO_3^- activation and resulted in a higher specific activity of the enzyme. The stimulation of the enzyme was not confined to the base HCO_3^- as other bases such as selenite, borate, arsenite, arsenate and sulfite were also effective in increasing the activity of the enzyme. ATPase stimulation was a function of pK and concentration of the base. Diisopropyl fluorophosphate and methane sulfonyl chloride both inhibited the ATPase activity and with the latter compound base (HCO_3^-) activation was considerably more sensitive to the inhibitor, except at the highest concentration. Dialysis against ^2H_2O followed by assay in a ^2H_2O medium abolished the HCO_3^- stimulation of ATPase. A tentative hypothesis involving the active center of the enzyme in HCO_3^- activation is suggested.

9985 BOVINE PEPSINOGENS AND PEPSINS. THE SEQUENCE AROUND A REACTIVE ASPARTYL RESIDUE. (E.) Meitner, P. A. (Med. Coll. Wisconsin, Madison). *Biochem. J.* 124(4):673-676, 1971.

The reaction of bovine pepsin with a ^{14}C-labeled inhibitor N-diazoacetylnorleucine methyl ester and the identification of a heptapeptide containing a reactive aspartic acid residue is described. Bovine pepsin was inhibited by N-diazoacetylnorleucine methyl ester and the loss of activity measured by milk clotting and by hemoglobin digestion occurred at the same rate and was complete in 20 min. Digestion of the inhibited pepsin and isolation of a ^{14}C-labeled peptide using Sephadex G-25, electrophoresis at pH 3.5, paper chromatography and electrophoresis at pH 1.9 in this order yielded a peptide that gave a single radioactive ninhydrin-positive spot. Analysis of the peptide was done in vacuo with HCl and further degradation to phenylthiohydantoin derivatives. The N-terminal sequence was established by carboxypeptidase A digestion. The sequence of the heptapeptide was found to be: Ile-Val-Asp-Thr-Gly-Thr-Ser. The sequences surrounding the reactive aspartic acid is identified to porcine pepsin and therefore may represent an active precisely structured catalytic site.

9986 EFFECT OF PENTAGASTRIN ON MAXIMAL GASTRIC ACID OUTPUT IN RATS WITH GASTRIC FISTULAS. (E.) Kowalewski, K. (U. Alberta Surg.-Med. Res. Inst., Edmonton, Canada). *Arch. Int. Physiol. Biochim.* 79(3):545-554, 1971.

At surgery male Wistar rats were prepared with a chronic gastric fistula and a polyethylene cannula in the vena cava. Secretion studies were performed 3 weeks later, at which time the rats were infused by the caval cannula at a rate of 120 ml/kg for 24 hr with pentagastrin (at 24-1536 μg/kg/24 hr) or histamine dihydrochloride dissolved in saline (100 mg/kg/24 hr, a dose previously shown to give a maximal secretory response). The peak response in the volume of gastric juice and the concentration and output of HCl with pentagastrin occurred with a dose of 768 μg/kg/24 hr (32 μg/kg/hr), while the peak output of pepsin occurred after a pentagastrin dose of 672 μg/kg/24 hr (28 μg/kg/hr). In pentagastrin-infused rats, peak values for the output of HCl and pepsin were more than twice those seen in histamine-infused rats.

9987 THE ISOLATION AND COMPOSITION OF THE MAJOR GLYCOPROTEIN FROM HUMAN GASTRIC ASPIRATES. (E.) Schrager, J. (Roy. Albert Edward Infirm., Wigan, Lancashire, England) and M. D. G. Oates. *Gut* 12(7):559-569, 1971.

Carbohydrate, amino acid and sulfate content of 99 human gastric aspirates using Ecteola cellulose elution and cetylpyridinium chloride precipitation was determined. Following gel chromatography (Bio-Gel P150) the nonretarded glycoprotein fraction contained mainly galactose, glucosamine and galactosamine in a ratio of 4:3:1, resp. A positive correlation was found between the blood group specificity of any gastric secretion with the quantitative analysis of the monosaccharides forming the sugar moiety of the glycoprotein. In addition, the hemoagglutination titer of the nonretarded fraction was directly related to its galactosamine:glucosamine ratio. Amino acid and carbohydrate composition were similar for nonretarded fractions, subfractions eluted on Ecteola cellulose, and cetylpyridinium chloride precipitates, although the latter was less efficient than elution on Bio-Gel P150. The fractions eluted on Ecteola cellulose were similar and demonstrated the variability in sulfate content of the glycoproteins. Isolated glycoproteins were shown to contain 68-96% of the carbohydrates in the gastric secretion with Bio-Gel P150, 96% of the sialic acid found in gastric aspirates was distributed between the second (pepsin) and third (polypeptide) retarded fractions which were similar to the composition of plasma glycoproteins.

9988 ASPECTS ON THE USE OF A GASTRIN PENTAPEPTIDE FOR EVALUATION OF THE GASTRIC SECRETION. (E.) Nordgren, B. (Univ. Hosp., Uppsala, Sweden). *Scand. J. Gastroenterol.* 6(4):287-289, 1971.

Gastric peptides (tetra and pentapeptide) have a high stimulatory effect on gastric secretion with few side effects. These peptides have replaced histamine in clinical tests of the gastric secretion. When high doses of peptides are used a decrease in secretory response may occur. When continuous injection rate of gastrin pentapeptide is increased, after an initial increase in the rate of volume secretion there was a decrease. The usual dose to measure maximum acid output was 6 μg/kg. A dose of 1 μg/kg body weight gave a steady state level; with higher doses no steady state was obtained, and a decrease in volume secretion was observed. Continuous infusion of high doses of histamine dihydrochloride

(41.8 μg/kg) gave a volume secretion of 4.1 ml/min and acid output of 476 μ Eq/min; considerable decrease in volume secretion and acid output was obtained with higher doses. Also, 6 μg/kg of pentapeptide was given by i.m. injection; the acid output was 400 μEq/min as peak acid output. I.v. injection led to steady state conditions; steady rate of volume secretion and constant acidity. Thus a decrease in secretory response is detected, but the practical importance has not been established. One possibility is a difference in sensitivity to pentapeptide among the population so that "maximal dose" of stimulation is supramaximal for some individuals and gives rise to inhibition of secretory response. Continuous i.v. infusion is the route of choice for administration of pentapeptide.

9989 ACID RESPONSES TO HISTAMINE, PENTAGASTRIN AND HUMAN GASTRIN I IN CONSCIOUS CATS WITH GASTRIC FISTULAS AND HEIDENHAIN POUCHES. (E.) Svensson, S.-O., I. Borg and S. Emas (Gen. Hosp., Malmo, Sweden). *Am. J. Dig. Dis.* 16(9): 783-788, 1971.

The acid output in response to graded doses of histamine dihydrochloride, pentagastrin or synthetic human gastrin I was simultaneously recorded from the gastric fistula of vagally innervated stomach and vagally denervated fundic Heidenhain pouch in conscious cats. Four cats provided with both a gastric fistula of the vagally innervated main stomach and a separated vagally denervated pouch of the oxyntic gland area of the stomach. Both were drained by a cannula. At submaximal doses, the relative potency of pentagastrin and gastrin is higher in the presence of tonic vagal impulses to the oxyntic glands. For histamine, the potency is equal. The maximum responses to all 3 stimulants were equal in both the gastric fistula and the Heidenhain pouch. Significantly higher doses of pentagastrin and gastrin were required to produce half the maximum response in the Heidenhain pouch than was required in the gastric fistula. No difference was noted between the gastric fistula and the Heidenhain pouch for histamine.

9990 THE EFFECT OF GLYCOPYRROLATE ON GASTRIC SECRETION AND TERMINAL ANTRAL MOTOR ACTIVITY IN VAGALLY INNERVATED AND DENERVATED GASTRIC POUCH DOGS. (E.) Alphin, R. S. (A. H. Robins Res. Labs., Richmond, Va.), D. A. Droppleman and J. W. Ward. *Arch. Int. Pharmacodyn. Ther.* 192(1):66-71, 1971.

Four female dogs were surgically prepared with either Heidenhain (vagally denervated) or Thomas (vagally innervated) gastric pouches. No depression of motility or pouch secretion was observed in any dog using the smallest dose (1 μg/kg) of glycopyrrolate but a transient increase in antral motility and pouch secretion was observed occasionally. When 100 μg/kg was given, a significant decrease in pouch volume and acid output was observed in all dogs whereas no change was observed in antral motility. Using 1000 μg/kg of glycopyrrolate, all dogs exhibited a significant reduction in pouch secretion and motility. Glycopyrrolate at 100 μg/kg reduced pouch secretion by almost 50%, while a ten-fold increase in dosage (1000 μg/kg) was required to reduce antral motility by 42%. Dogs with Thomas pouches given glycopyrrolate following a test meal showed unaffected motility and secretion at a dose of 1 μg/kg while a dose of 100 μg/kg markedly reduced pouch volume and acidity and had no effect on antral motility. Motility and pouch response were considerably depressed by a dose of 1000 μg/kg.

9991 KINETICS OF INHIBITION OF CANINE GASTRIC SECRETION BY VASOPRESSIN. (E.) Blum, A. L. (Triemli City Hosp., Zurich, Switzerland). *Gastroenterology* 61(4, Pt. 1):461-469, 1971.

In 3 dogs with gastric fistulas i.v. injection of vasopressin resulted in a rapid fall of histamine-stimulated secretion followed by a gradual return to control levels. The inhibitory effect was dose-dependent and a threshold of 10 mU/kg existed for vasopressin inhibited gastric acid secretion. In response to increasing doses of histamine either infused alone or with constant-dose vasopressin, vasopressin reduced the acid output and flow rate, but had no detectable effect on acid concentration. The kinetics showed the characteristics of competitive inhibition in that the maximal response remained unchanged while the dose which elicited half the maximal response doubled from 57/μg/kg/hr with histamine alone to 128 μg/kg/hr on the addition of vasopressin. These results were consistent with either the vasoactive or water-conserving properties of vasopressin.

9992 EFFECT OF BETAZOLE HYDROCHLORIDE ON MUCOSAL SECRETION IN THE HUMAN STOMACH. (Fr.) André, F. (E. Herriot Hosp., Lyon, France), C. André and R. Lambert. *C. R. Soc. Biol. (Paris)* 165(1):94-97, 1971.

Gastric secretion was studied 1 hr before and for 2 hr after administration of betazole hydrochloride (1.5 mg/kg i.m.) to a 60-yr-old woman with hemachromatosis and complete salivary gland sclerosis and to a 50-yr-old control with infectious jejunitis. The carbohydrate composition of gastric mucus was determined by washing the ethanol precipitate with ethanol and acetone and subjecting the solids extracted to gas-liquid chromatography after separation into neutral, basic, and acidic fractions. Under basal conditions the carbohydrate content of gastric mucus was higher in the subject whose gastric contents were contaminated with saliva. After betazole stimulation the carbohydrate content of gastric mucus increased in the subject with salivary gland sclerosis and after 3 hr reached 173-218% of basal values.

During the same period the carbohydrate content of gastric mucus decreased to 54-68% of basal values in the subject whose gastric contents were contaminated by saliva. Stimulation of gastric mucus secretion observed in the first subject was masked in the second by fluctuations in salivary secretion.

9993 STOMACH SECRETION AFTER STIMULATION WITH 15-LEUCINE-SUBSTITUTED HUMAN GASTRIN I. (Ger.) Konz, B. (U. Munich Surg. Polyclin., Germany), F. Holle, E. Wünsch, K. Kissler and E. Leimer. *Z. Gastroenterol.* 9(6): 413-419, 1971.

A new synthetic gastrin analogue, in which the 15-methionine in human gastrin I is replaced with leucine, stimulated gastric secretion but caused no systemic reactions when injected i.v. into 50 patients with radiologically confirmed duodenal ulcers. Within 20 min after i.v. injection of 0.002 mg/kg of this gastrin analogue, the volume of gastric juice and gastric acid secretion increased very rapidly and remained increased for about 1 hr. In 5 patients selective proximal vagotomy decreased 15-leucine-gastrin-stimulated secretion by 84.5% and decreased the maximal acid output significantly. Slow i.v. infusion of the new gastrin (0.001-0.003 mg/kg/hr) caused a more gradual increase in gastric secretion than i.v. injection. The hourly maximal acid output was the same for all 3 doses employed. This new gastrin analogue proved to be about 9 times more effective than pentagastrin, i.e. infusion of 0.002 mg/kg/hr i.v. of the new analogue was equivalent to i.m. injection of 0.006 mg/kg pentagastrin.

9994 CAFFEINE AND PENTAGASTRIN STIMULATION OF HUMAN GASTRIC SECRETION. (E.) Cohen, M. M. (U. British Columbia Vancouver Gen. Hosp., Canada), H. T. Debas, I. B. Holubitsky and R. C. Harrison. *Gastroenterology* 61(4, Pt. 1): 440-444, 1971.

Synergism between caffeine and pentagastrin was studied in 4 human volunteers with no gastrointestinal symptoms. Continuous i.v. pentagastrin infusion maintained a stable acid secretion at 46% of the mean maximal response to pentagastrin and the pepsin -output response was almost twice the basal output. Linear relationships were found between the plasma caffeine levels and the acid output or pepsin output in response to caffeine benzoate infused i.v. for 1 hr. The differences between the mean acid or pepsin outputs and the unstimulated outputs were highly significant. The mean output of acid or pepsin was greater in response to the combined infusion of caffeine and pentagastrin as compared to the mean response to pentagastrin alone. In all cases there was significant acid and pepsin stimulation 1/2 hr after the start of the caffeine infusion and positive correlations were demonstrated between plasma caffeine levels and the corresponding acid or pepsin outputs. In response to i.v. caffeine, acid and pepsin outputs during the 1 hr infusion and subsequent 2 hr after maintained a highly significant relation to each other. The acid and pepsin output response to pentagastrin plus caffeine infusion for 1 hr followed by pentagastrin alone for 1.5 hr was also linear. A definite synergistic effect between caffeine and pentagastrin was not demonstrated in this investigation although caffeine was demonstrated to significantly stimulate both basal and stimulated acid and pepsin secretion.

9995 UREA INACTIVATION OF BOVINE RENNIN AND PEPSIN. POSSIBLE USE FOR DETERMINING THEIR ACTIVITIES IN A MIXTURE. (Fr.) Douillard, R. (INRA Dept. Anim. Tech., Jouy-en-Josas, France). *Biochemie* 53(4):447-455, 1971.

It was established that urea inactivation of rennin and bovine pepsin I and pepsin II was a first-order reaction. At pH 6.3 and 10.3°C, 7.2 M of urea rapidly inactivated only bovine pepsin I, while at pH 3.25 and 27.5°C, 8.6 M urea caused rapid decreases in the activities of rennin and bovine pepsin I and only a slow decrease in bovine pepsin II. The kinetics of urea inactivation of a synthetic mixture of enzymes and of calf abomasal secretion after injection of acetylcholine (0.1 g s.c.) were similar. Thus, it is possible to determine the activities of these 3 enzymes in a mixture from differences in their rates of urea inactivation.

9996 EFFECT OF ACUTE HISTAMINE POISONING ON THE GASTRODUODENAL ENDOCRINE CELLS IN THE GUINEA PIG. (Fr.) Anghert, N. (Sch. Sci., Paris). *Arch. Anat. Micr. Morphol. Exp.* 60(3): 249-259, 1971.

9997 EXPERIMENTAL STUDIES IN ANIMALS ON GASTRIC ACID CHANGES UNDER ETHER ANESTHESIA. (SPONTANEOUS RESPIRATION, CONTROLLED VENTILATION, HYPOTHERMIA). (Ger.) Klimpel, L. (Reg. Hosp., Frankfurt/Oder, Germany). *Anaesthesist (Berl.)* 20(11):426-430, 1971.

9998 A METHOD FOR MEASURING GASTRIC SECRETION IN THE GUINEA PIG. (E.) Johnson, J. A. (Cent. Hosp., Tromso, Norway) and N. B. Fjeld. *Acta Chir. Scand.* 137(7):676-678, 1971.

See also numbers: 9961, 10404, 10783

9999 FACTORS REGULATING BIOSYNTHESIS, INTRACELLULAR TRANSPORT AND SECRETION OF AMYLASE AND LIPASE IN THE RAT EXOCRINE PANCREAS. (E.) Christophe, J. (U. Brussels Med. Sch.), J. Camus, M. Deschodt-Lanckman, J. Rathé, P. Robberecht, M. C. Vandermeers-Piret and A. Vandermeers. *Hormone Metabol. Res.* 3(6):393-403, 1971.

Carbohydrate and fat intake and subsequent utilization influenced amylase and lipase levels in opposite directions. Oils rich in unsaturated fatty acids were more efficient than saturated fats in increasing the lipase levels, while glucose was a better inducer of amylase than galactose or fructose. Adjustments of pancreatic hydrolase level was due mostly to proportional adjustments of their rates of biosynthesis. Although the turnover (secretion) time of lipase and amylase, once agglomerated in zymogen granules, was the same in a given physiological situation, the duration of amylase transport across the acinar cell was longer than that of lipase. When dietary proteins were the limiting factor, the common turnover time regarding different hydrolases was decreased. The observation of the near identity of the in vivo turnover time of both hydrolases is in favor of metabolic homogeneity of pancreatic secretory process.

10000 ELASTOLYTIC ENZYMES AND ELASTIN IN THE AGING RAT. I. PANCREATIC ELASTOLYTIC ENZYMES. (E.) Loeven, W. A. (Natl. Inst. Child. Health, Bethesda, Md.) and M. M. Baldwin. *Gerontologia* 17(3):170-182, 1971.

The decrease in elastoproteinase activity (expressed in units/g acetone-dried pancreas) found in male rats over the entire period from 1-24 mo, started in the females after the eighteenth month, immediately following a rise in enzyme activity between 15 and 18 months. In males the activity of both elastomucases decreased rapidly during the first half of the life span, older rats showing a very small change in enzyme activity. A rapid decrease of elastomucase activity also occurred in the female rats during the first 6 mo of life, followed by a constant activity level between 6 and 15 months. As found for elastoproteinase, there was a sudden increase in enzyme activity in female pancreas between 15 and 18 months. Similar age relationships for human serum elastoproteinase have been found.

10001 PARTITION CHROMATOGRAPHY OF GLUCAGON AND SECRETIN ON SEPHADEX. (E.) Hruby, V. J. (U. Arizona Dept. Chem., Tucson) and C. M. Groginsky. *J. Chromatogr.* 63(2):423-428, 1971.

The development of solvent systems suitable for the partition chromatography of glucagon and secretin, 2 moderate sized polypeptide hormones, is reported. Although the 2 hormones have remarkably similar amino acid sequences they behave quite differently in every solvent system. For glucagon, it was possible to adjust the R_F (ratio of hold-up volume to elution volume) to a suitable value by altering the polarity of the system (change the proportion of benzene). Apparently the solubility of glucagon in the mobile phase relative to the stationary phase is altered sufficiently by this polarity change alone, and this effect dominates other possible effects such as pH and absorption. Thus glucagon has a different residence time in the gel, and changes in elution volume can be predicted simply by polarity changes. On the other hand, secretin was rapidly eluted (high R_F values) even with a relatively non-polar solvent system. For secretin it was necessary to decrease the pH of the system to a slightly acidic value in order to obtain a reasonable R_F; a lower phase pH between 4.5 and 4.7 was necessary to obtain an R_F value near 0.3.

10002 PANCREAS ACINAR CELL DIFFERENTIATION. VI. EFFECTS OF METHYL DONORS AND HOMOCYSTEINE. (E.) Parsa, I. (State U. New York Downstate Med. Ctr., Brooklyn), W. H. Marsh and P. J. Fitzgerald. *Fed. Proc.* 31(1):166-175, 1972.

A basal methionine level (30 mg/liter) is necessary for proliferation and growth of the acinar cell of rat pancreatic anlage in organ culture. Additional amounts (50 mg/liter), however, are needed for acinar cell differentiation, defined morphologically in terms of prozymogen vacuole and zymogen granule formation and functionally as amylase, lipase and chymotrypsin activity elevations. Methyl donors like S-adenosyl-L-methionine and choline, when added to the basal amount of methionine required for growth, caused some degree of morphologic and enzymatic differentiation. Methyl groups are apparently necessary for differentiation, since homocysteine (demethylated methionine) in equimolar amounts could not substitute for methionine. DNA synthesis was considerably decreased at days 2-3 of organ culture in mediums with control amounts of methionine. Since enzymatic levels in the anlage grown for 9 days in the methionine deficient medium are at about the day 2-3 levels, methylation of compounds inhibiting DNA synthesis and stimulating enzyme synthesis occurs at about day 2-3 of organ culture.

10003 A COMPARATIVE α-AMYLASE STUDY USING AN AGAR MEDIUM. (E.) Ceska, M. (Pharmacia AB, Uppsala, Sweden). *Clin. Chim. Acta* 36(2):419-429, 1972.

Using a previously described plate method, normal human serum, plasma and urine, as well as serum and urine from patients (acute pancreatitis) showing elevated levels of alpha-amylase, were compared to Hyland standard serum. The plate method involved the hydrolysis of blue starch polymer incorporated into agar solidified media by human sera and urine. A high correlation coefficient was obtained when comparing this method with saccharogenic, amyloclastic and chromogenic methods using 189 serum samples and 161 urines. The recommended normal range for human serum assays by this plate method after 8 hr of incubation at 37°C would correspond to diameters of the transparent circular area (zone of hydrolysis) of 5.54-7.70 mm and for human urine a range of 6.78-10.28 mm. This would correspond to a range of 54-308 U/liter for serum and 143-2325 U/liter for urine.

10004 EFFECTS OF PILOCARPINE ON L-DOPA TURNOVER IN THE EXOCRINE RAT PANCREAS. (E.) Alm, P. (U. Lund Inst. Anat. Histol., Sweden). *Acta Physiol. Scand.* 83(2):269-277, 1971.

Administration of pilocarpine, alone or together with nialamide before the administration of L-DOPA, resulted in almost total extrusion of the pancreatic zymogen granules and a strong diffuse fluorescence after 10 min. Pilocarpine administration led to a decreased weight of the whole rat pancreatic gland. The DOPA turnover was unchanged but the dopamine levels were higher 10 min after the L-DOPA administration in animals pretreated with pilocarpine. Both DOPA and dopamine levels were lower from 20 min on. Pretreatment with both nialamide and pilocarpine resulted in lower amounts of dopamine than after pretreatment with only nialamide 10 min after the L-DOPA administration. L-DOPA turnover is apparently influenced by changes in the pancreatic secretory activity.

10005 EFFECT OF OXYTETRACYCLINE ON THE KINETICS OF SECRETION IN RAT EXOCRINE PANCREAS. (Ger.) Hobusch, D. (U. Rostock Inst. Gen. Spec. Pathol., Germany) and H.-P. Putzke. *Exp. Pathol.* 5(5/6):298-307, 1971.

Histologic, histochemical and electron microscopic studies, after i.p. administration of oxytetracycline HCl, showed that doses in the middle to upper therapeutic range induced only slight morphologic or substructural changes (characteristic of moderately increased secretory activity) in the acinic epithelial cells of the pancreas of female rats. After doses in excess of the therapeutic range, exocrine pancreatic secretion was sharply inhibited, accompanied by atrophy of the acini and hyperplasia of the Golgi apparatus. The phenomenon was spontaneously reversible within 1 week following withdrawal of the agent.

10006 MECHANISMS OF PRODUCTION OF CIRCULATORY SHOCK FACTORS IN ISOLATED PERFUSED PANCREAS. (E.) Ferguson, W. W. (U. Virginia Sch. Med., Charlottesville), T. M. Glenn and A. M. Lefer. *Am. J. Physiol.* 22(2):450-457, 1972.

The in vitro preparation consists of the pancreas, its vessels and mesentery removed from mongrel cats after an overnight fast. Increased pancreatic release and increased enzymatic activity of lysosomal β-glucuronidase and cathepsin D were seen under conditions of hypoxia and ischemia, but not acidosis. Electron microscopy of pancreases after 2½ hours of perfusion, showed that with hypoxia or ischemia there was enlargement and vacuolization of lysosomes and a widening of the intracisternal spaces of the rough endoplasmic reticulum. Both the release of the hydrolytic enzymes and the ultrastructural changes were prevented by the administration of methylprednisolone (30 mg/kg i.v. prior to surgery and 30 mg/55 ml of perfusate prior to the 90-min period of hypoxia) in pancreases subjected to hypoxia. Pancreatic homogenates, but not perfusates, from pancreases subjected to hypoxia or ischemia showed significant elevations of activity of myocardial depressant factor; this was not seen with acidosis or with hypoxia preceded by methylprednisolone. Addition of concentrated preparations of lysosomal enzymes to the perfusate in activities comparable to that observed during circulatory shock resulted in a progressive rise in perfusion pressure from normal levels of 35 mm Hg to over 200 mm Hg within 36 min. The venous flow rate began to decrease with pressures over 100 mm Hg and was reduced by more than 50% with pressures of 200 mm Hg.

10007 LOCALIZATION OF CHOLECYSTOKININ RELEASE IN INTESTINE OF THE DOG. (E.) Konturek, S. J. (Med. Acad. Inst. Physiol., Cracow, Poland), J. Tasler and W. Obtułowicz. *Am. J. Physiol.* 222(1):16-20, 1972.

Experimental dogs were prepared with chronic pancreatic fistulas, gastric fistulas and Pavlov pouches. In those with a duodenojejunal Thiry intestinal loop, perfusion of this isolated segment with a solution containing 125 mM L-leucine and 100 mM tryptophan (pH 7.0, 300 mOsm/liter) caused a marked increase in pancreatic protein output (comparable with that seen in response to i.v. cholecystokinin or caerulein) and a slight increase in pancreatic bicarbonate secretion. Changes were less marked with perfusion of a distal jejunal loop and there were no changes in pancreatic secretion with perfusion of a distal ileal loop. The Pavlov-pouch response to i.v. pentagastrin was inhibited by the amino acid perfusion of the duodenojejunal loop, while this parameter was not affected by perfusion of either the distal jejunal or distal ileal loops.

10008 EFFECTS OF PHENOBARBITAL PRETREATMENT ON RAT PANCREAS. (E.) Lavigne, J.-G. (U. Montreal Fac. Med., Quebec, Canada) and C. Marchand. *Am. J. Physiol.* 222(2):360-364, 1972.

Female Sprague-Dawley rats received 3 daily i.p. injections of 50 mg/kg of phenobarbital sodium, while controls received saline. In some experiments, 0.5 mg/kg atropine sulfate was injected i.v. into the tail vein 1 hr before collection of pancreatobiliary secretion. Phenobarbital-treated rats showed a significant increase in weight of the pancreas similar to that of the liver, in the absence of any alterations of total body weight. The increase in pancreatic microsomal proteins was proportionally higher than in the liver. There was also an increase in both in vivo and in vitro incorporation of L-leucine-^{14}C into microsomal proteins. This could not be explained by an increase in pancreatic drug-metabolizing enzymes. There was, however, an increase in pancreatic secretion of amylase, lipase and ribonuclease. The i.v. administration of atropine decreased, but did not block, the pancreatobiliary secretion and its protein content.

10009 A MULTIVARIATE ANALYSIS OF DATA RESULTING FROM AN INTUBATION STUDY OF PANCREATIC FUNCTION. (Fr.) Capitaine, Y. (Natl. Inst. Health Med. Res., Marseilles, France), R.-C. Cros, L. Gullo, C. de Barros-Mott, J. Pastor, A. M. Pauli and H. Sarles. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):301-308, 1971.

Data derived by gastroduodenal intubation of 73 control subjects, 39 patients with chronic pancreatitis, 18 with acute pancreatitis and 39 with gastrointestinal disorders not affecting the pancreas were subjected to analysis by the classical statistical approach (variable by variable), discriminant analysis (using Fisher's method), factorial analysis, and a non-parametric, multivariate technique proposed by one of the authors. The proposed method is said to improve diagnostic reliability significantly, in addition to simplifying procedures by eliminating values determined before or more than 30 min after administration of secretin or pancreozymin, studies of secretory volume, enzyme and bicarbonate determinations, and determinations of trypsin. However, determinations of calcium and amylase were required to distinguish patients with acute pancreatitis from normal controls and from controls with gastrointestinal disorders not affecting the pancreas.

10010 EFFECTS OF EXOGENOUS AND ENDOGENOUS HISTAMINE AND OF ANTIHISTAMINES ON THE VASOMOTOR ACTIVITY AND SECRETION OF ISOLATED, PERFUSED DOG PANCREAS. (Fr.) Pascal, J. P. (Purpan Hosp., Toulouse, France), N. Vaysse, J. P. Boucard, J. Laval and A. Ribet. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):279-286, 1971.

In isolated dog pancreas perfused with heparinized, whole blood, i.a. administration of histamine failed to induce any secretory activity, but did induce rapid, intense vasodilatation, which was not affected in any way by the simultaneous or prior administration of promethazine or mepyramine maleate. Liberation of endogenous histamine by i.a. administration of Compound 48/80 yielded identical results, although a marked fading effect was evidenced when injections were repeated, due to exhaustion of the available supply. Neither of the antihistamines exerted any discernible effect on the ability of secretin to stimulate secretory activity.

10011 ISOLATED PERFUSION OF THE PANCREAS IN THE DOG. A QUANTITATIVE INFRASTRUCTURAL STUDY OF SPONTANEOUS EXOCRINE SECRETION. (Fr.) Stock, C. (INSERM Res. Unit., Strasbourg, France), P. Stoebner, M. Roos, M. Gillet, J. Kachelhoffer and J. F. Grenier. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):287-300, 1971.

Duodenal pancreatic blocks were isolated and perfused with whole, homologous blood for 30 min in a closed circuit, then for 2 hr in an open circuit, with biopsy specimens taken at intervals. Electron microscopic study of these specimens showed no significant morphologic changes of acinar, centroacinar or canalicular cells throughout the entire observation period. Spontaneous exocrine secretion continued throughout the perfusion period and varied considerably in quantity between individual pancreases according to the total granular population of the secretory cells. In each pancreas, this total granular population remained essentially constant, although the secretory act was accompanied by a definable, characteristic sequence of granular transformations and movements, apparently related directly to the production of pancreatic juice. These included transformation of zymogen granules into clear granules (consisting primarily of secretory vacuoles), apparently by a process of lavage. Mixed granules and intermediate stages were clearly demonstrable, as was a progressive increase of the volume of the clear granules, prior to excretion and the synthesis of new zymogen granules to replace those which were being lost.

10012 HISTOCHEMICAL AND ELECTRON MICROSCOPIC STUDIES ON THE SECRETION KINETICS OF PANCREATIC ACINAR CELLS OF FASTING RATS. (Ger.) Richter, K. (U. Rostock Inst. Gen. Spec. Pathol., Germany), H.-P. Putzke and A. Bienengräber. *Exp. Pathol. (Jena)* 5(3-4):192-199, 1971.

Absolute starvation (35 Wistar rats, 250 g body wt) for 4-7 day (water ad libitum) resulted in atrophy of the pancreas, acinar shrinkage, moderate damage to the endoplasmic reticulum and mitochondria of acinar epithelium, decreased activity of intermediary and secretory enzymes (alkaline phosphatase, adenosine triphosphatase, non-specific esterase and lipase, succinic dehydrogenase, cytochrome oxidase), diminution of mature secretory granules and marked enlargement of the Golgi apparatus. The strong hyperplasia of the Golgi apparatus and increased acid phosphatase activity was considered to be due to a decreased consumption of membrane material and its slower synthesis resulting from decreased synthesis of enzyme protein. It is suggested that hyperplasia of the Golgi apparatus is not necessarily an expression of intensified function of secretory cells.

10013 ROLE OF CYCLIC 3',5'-AMP IN THE ACTION OF PHYSIOLOGICAL SECRETAGOGUES ON THE METABOLISM OF RAT PANCREAS IN VITRO. (E.)

Bauduin, H. (U. Brussels Sch. Med., Belgium), L. Rochus, D. Vincent and J. E. Dumont. *Biochim. Biophys. Acta* 252(1):171-173, 1971.

The comparative effects of carbamylcholine, dibutyryl cyclic AMP, cyclic AMP and methyl xanthine on secretion and metabolism of the rat pancreas was studied in vitro. Both dibutyryl cyclic AMP and cyclic AMP increased the release of chymotrypsinogen and lipase but did not exceed 250% of control. Dose-response secretion curves for dibutyryl cyclic AMP, carbamylcholine and pancreozymin showed similar stimulation of enzyme release at concentrations of 100 µM, 0.5-1.0 µM and 0.006-0.008 Ivy U/ml, resp. The maximal secretion obtained was similar for pancreozymin and carbamylcholine but was an order of magnitude lower for dibutyryl cyclic AMP. Theophylline and caffeine (1.2 mM) had no effect on pancreatic enzymatic release although they usually potentiated the sub-maximal concentration of dibutyryl cyclic AMP-induced enzyme release. These compounds failed to alter the carbamylcholine and the pancreozymin response; however, they did potentiate the maximum secretion caused by these 2 compounds. Neither cyclic AMP, dibutyryl cyclic AMP nor carbamylcholine could alter the oxygen uptake. L-[4,5-$^3H_2$] leucine incorporation into proteins was not altered by dibutyryl cyclic AMP and was inhibited by either 0.01 mM carbamylcholine or 1.3 mM methylxanthine. Similarly, carbamylcholine increased the incorporation of D-[$^{14}C_6$]-glucose into proteins while dibutyryl cyclic AMP was without effect. Carbamylcholine also increased the incorporation of ^{32}Pi into monophosphatidylinositols phospholipid fraction while dibutyryl cyclic AMP did not affect this parameter, although the enzyme release was doubled. Cyclic AMP appears to be involved in pancreatic secretion but does not appear to be the only mediator of all the effects of the physiological secretagogues.

10014 IN VITRO STIMULATION OF ENZYME SECRETION AND THE SYNTHESIS OF MICROSOMAL MEMBRANES IN THE PANCREAS OF THE GUINEA PIG. (E.)

Meldolesi, J. (U. Milan Dept. Pharmacol., Italy) and D. Cova. *J. Cell Biol.* 51(2):396-404, 1971.

Subfraction of rough and smooth microsomes were isolated from the guinea pig pancreas by separating nonmembrane proteins from the membranes, and the effect of in vitro stimulation of enzyme secretion on the incorporation of ^{32}Pi into membrane phospholipid and of L-leucine-^{14}C into the membranes was studied. The fractions were successfully separated by incubation at 4°C for 4 hr in 0.0005 M puromycin at high ionic strength followed by extraction with 0.2 M $NaHCO_3$ at pH 7.8. Incubation of pancreas slices in the presence of carbachol (0.0001 M) elicited a large increment of the ^{32}Pi incorporation into microsomal PLP in both rough and smooth microsomes, and was particularly marked in the latter fraction where the increase was nearly fourfold. No significant changes in L-leucine-^{14}C incorporation into the proteins of the membranes or other subfractions was observed following carbachol stimulation. Exocytosis does not seem to be coupled with an increased rate of synthesis of complete endoplasmic reticulum and Golgi membranes. Thus, excess plasma membrane may be preserved and reused throughout the secretory cycle.

10015 ACTIVE TRANSPORT OF GLYCINE BY MOUSE PANCREAS. EVIDENCE AGAINST THE Na^+ GRADIENT HYPOTHESIS. (E.)

Lin, K. T. (McGill U. Dept. Biochem., Montreal, Quebec, Canada) and R. M. Johnstone. *Biochem. Biophys. Acta* 249(1): 144-158, 1971.

Under conditions of in vitro incubation the mouse pancreas did not maintain a large Na^+ gradient, while a significant K^+ gradient was maintained. After 60 min at 37° the Na^+ gradient was less than 30 mM, being completely absent at the start of the incubation. Despite the small Na^+ gradient, extensive accumulation of glycine against its concentration gradient was found. Incubation with dinitrophenol resulted in a gradual loss of glycine transport activity and was related to the time of exposure to dinitrophenol, inhibition continuing even after the ions had reached a steady state. Anaerobic incubation with N_2 reduced glycine uptake more than with dinitrophenol under aerobic conditions although the effects on cation distribution were comparable. Oubain (0.1 mM) decreased glycine uptake at steady state by 50% without a substantial effect on the intracellular Na^+ and K^+ concentrations and could only disturb the steady-state cellular K^+ by 50% at a 10-fold increase in concentration. Extracellular Na^+ enhanced glycine transport in mouse pancreas by increasing maximum uptake by increasing the V_{max} of glycine uptake without a significant effect on the K_m. Tissue uptake of glycine can be related to the levels of extracellular Na^+ and cellular ATP but not with the degree of Na^+ and/or K^+ fluxes. The extracellular Na^+ was responsible for the initial rate of glycine uptake. Both Na^+ and ATP appear to enhance glycine transport in mouse pancreas primarily by increasing the maximum uptake and both act by affecting the V_{max}.

See also number: 9968

10016 INHIBITION OF RIBOSOMAL RIBONUCLEIC ACID MATURATION IN RAT LIVER BY 5-FLUOROOROTIC ACID RESULTING IN THE SELECTIVE LABELING OF CYTOPLASMIC MESSENGER RIBONUCLEIC ACID. (E.) Wilkinson, D. S. (U. Wisconsin Med. Sch., Madison), A. Cihak and H. C. Pitot. *J. Biol. Chem.* 246(21):6418-6427, 1971.

Male Holtzman albino rats received i.p. injections of either 5-fluoro $[2\text{-}^{14}C]$ orotic acid or $[6\text{-}^{14}C]$ orotic acid. Polyribosomes and both nuclear and cytoplasmic ribonucleoprotein particles were prepared from rats fasted for 24 hr before death. Little or no newly synthesized ribosomal RNA was found in the cytoplasm for at least 3 hr after administration of low doses of 5-fluoroorotic acid. The analogue was, however, incorporated into a fraction of cytoplasmic RNA which appeared to be messenger RNA. Despite relatively equal rates of orotic acid and 5-fluoroorotic acid incorporation into total nuclear RNA, the amount of analogue-labeled microsomal RNA lagged considerably behind that of orotate-labeled microsomal RNA. Since there was no overall accumulation of labeled RNA in the nuclei of rats receiving 5-fluoroorotate, it seems there is a relatively greater degradation of the newly synthesized analogue-containing RNA.

10017 CIRCADIAN VARIATIONS OF THE LIVER CELL NUCLEOLI IN THE NORMAL RAT IN TERMS OF THE FEEDING HOUR (NOTE III). (E.) Barbărasă, C. (Inst. Public Health Med. Res., Iasi, Rumania). *Rev. Roum. Embryol. Cytol.* 8(1):93-105, 1971.

Variable feeding schedules with a fixed feeding hour were employed in rats to study the morphologic changes in the hepatocytes in the course of a circadian rhythm. Hepatocyte nuclei with a minimum number of nucleoli predominated 6 hr after feeding, while those with a maximum number of nucleoli were seen 12 hr after feeding. The number of eccentric nucleoli were increased in the small lobular zones at 6 hr after feeding and in the large ones at 12 hr. Both the number of polyploid cells and the mean number of nucleoli: nucleus were correlated with the number of large, eccentric nucleoli; this correlation was at a minimum at 6 hr, and at a maximum at 12 and 18 hr.

10018 HETEROTOPIC AUXILIARY LIVER TRANSPLANTATION IN RATS. USE OF THE INTRAHEPATIC VENA CAVA AS THE EFFERENT VESSEL. (E.) Kort, W. J. (Med. Fac., Rotterdam, Netherlands), E. D. Wolff and W. N. Eastham. *Transplantation* 12(6): 415-420, 1971.

Experimental animals consisted of 40 inbred, specific pathogen-free female Wag/Rij or BN/Bi rats which underwent isogeneic or allogeneic (BN/Bi to Wag/Rij) auxiliary liver transplantation after 70% hepatectomy and right nephrectomy. The donor organ was transplanted with a portal afferent blood supply and either the infrahepatic (19 rats) or suprahepatic (21) part of the inferior vena cava as the efferent vessel. Animals with allogeneic grafts were sacrificed on day 5, those with isogeneic grafts on days 7, 8, 9. Rats with suprahepatic inferior vena cava showed a high operative mortality and moderate to severe congestion in the graft in over 50% of the cases. The postoperative survival rate was increased and the congestion prevented with use of the infrahepatic portion of the inferior vena cava. In animals that survived for 4 days or longer, bile duct proliferation was noted in both isogeneic and allogeneic transplanted livers. Graft rejection was observed in allogeneic transplanted livers.

10019 ALANINE METABOLISM IN PERFUSED LIVERS OF NORMAL AND ADRENALECTOMIZED RATS. (E.) Haft, D. E. (New York Med. Coll., N. Y.), E. Tennen and S. Mehtalia. *Am. J. Physiol.* 222(2):365-372, 1972.

Adrenalectomy was performed 5-7 days before in vitro perfusion of livers (from fasted Wistar rats) for 3 hr with diluted heparinized rat (fasted Sprague-Dawley) blood; adrenalectomy was performed 4-6 days before perfusion for 1 hr of isolated rat livers with washed rat or beef RBC, resuspended in albumin and buffer. Livers of adrenalectomized and intact (control) rats were perfused with L-alanine-U-^{14}C with or without addition of 100 mg of mixed L-amino acids. Net glucose production was observed only during perfusion of the livers at hypoglycemic levels. Prior adrenalectomy did not alter urea synthesis, production of glucose or hepatic and plasma concentration of amino acid nitrogen. In some animals increased incorporation of label into glucose was seen in adrenalectomized rats, but this was probably due to a smaller alanine pool rather than increased gluconeogenesis. In both intact and adrenalectomized rats, addition of 200 mg octanoate to the perfusion medium reduced the oxidation of ^{14}C to $^{14}CO_2$ and increased its incorporation into protein; it also inhibited the amino acid-increased synthesis of urea. The data suggest that, in the presence of adequate precursor, adrenalectomy does not alter hepatic gluconeogenesis.

10020 MICELLAR THEORY OF BILIARY CHOLESTEROL EXCRETION. (E.) Hardison, W. G. M. (Rush-Presbyterian-St. Luke's Med. Ctr., Chicago, Ill.) and J. T. Apter. *Am. J. Physiol.* 222(1): 61-67, 1972.

Sprague-Dawley rats were prepared with polyethylene cannulas in the femoral vein and in the proximal third of the common bile duct, and received i.v. infusions of 0.5 to 1.5 μmoles/min of sodium taurocholate (a micelle-forming bile salt). In some, sodium dehydrocholate (a nonmicelle-forming bile salt) was also infused. With infusion of taurocholate, the increase in biliary bile salt excretion was accompanied by an increase in biliary lipid excretion. This relationship, however, was not linear; at high rates of excretion of bile salts, there was little increase in rate of excretion of biliary lipid, in spite of the increasing rate of excretion of biliary bile salts. With infusion of dehydrocholate, there was little increase in excretion of biliary lipid. At low rates of excretion of bile salts and phospholipid, the proportion of cholesterol remained disproportionally high; at low rates bile was more nearly saturated or supersaturated with cholesterol than at high rates. The data suggest that, although micellar solubilization is most important for biliary lipid excretion, this mechanism alone does not explain all aspects of this process.

10021 COMPARISON OF LIVER MITOCHONDRIAL FUNCTION AFTER END TO SIDE AND SIDE TO SIDE PORTACAVAL SHUNTING. (E.) Bekoe, S., B. Mizock, A. Rone and G. W. Peskin (Univ. Hosp., San Diego, Calif.). *Am. J. Surg.* 123(1):43-48, 1972.

The experimental model using the half and half shunt provided a built-in control to compare the 2 procedures in the same experimental dogs. Microscopic sections of the end-to-side half livers showed congested, dilated sinusoidal spaces with hepatocyte ballooning and focal necrosis; at 10 months there were areas of fibrosis. The side-to-side half livers were minimally altered with mild congestion only. The half liver served by side-to-side shunt showed better mitochondrial function, as reflected by an enhanced respiratory control index, than the end-to-side half. This increase in cellular respiratory function is attributed to better perfusion related to the hepatic decompression known to occur when a side-to-side shunt is performed.

10022 PREVENTION BY CYSTAMINE OF LIVER NECROSIS AND EARLY BIOCHEMICAL ALTERATIONS INDUCED BY CARBON TETRACHLORIDE. (E.) Castro, J. A. (CITEFA - V. Martelli Lab. Chem. Biol. Toxicol., Buenos Aires, Argentina), E. V. Cignoli, C. R. de Castro and O. M. de Fenos. *Biochem. Pharmacol.* 21(1):49-57, 1972.

Cystamine prevented the liver weight increase, NADP linked isocitric dehydrogenase activity efflux from liver to plasma, necrosis and fatty infiltration caused by carbon tetrachloride 24 hr after its oral administration. Pretreatment with cystamine prevented not only a depressed glucose-6-phosphatase activity but also the destruction of ethylmorphine N-demethylase activity caused by CCl_4 3 hr after oral administration. Cystamine apparently delays the gastrointestinal absorption of CCl_4. Cystamine was also effective in preventing liver damage caused by i.p. administration of CCl_4; it blocked the irreversible binding of ^{14}C from $^{14}CCl_4$ to liver microsomal lipids and glucose-6-phosphatase depression. However, microsomal lipid peroxidation process was not inhibited, and CCl_4 levels in the livers of cystamine-treated and untreated rats were similar. Ethylmorphine N-demethylase destruction was not prevented. The effect of the initial CCl_3 and Cl free radicals may be more pertinent than lipid peroxidation to the development of necrosis.

10023 THE HEPATIC CHALONE. I. ASSAY METHOD FOR THE HORMONE AND PURIFICATION OF THE RABBIT LIVER CHALONE. (E.) Verly, W. G. (U. Montreal Dept. Biochem., Quebec, Canada), Y. Deschamps, J. Pushpathadam and M. Desrosiers. *Can. J. Biochem.* 49(12):1376-1383, 1971.

Starting from rabbit liver, a 450-fold purification was obtained of the hormone, chalone. The hepatic chalone was a small peptide and was tissue-specific but not species-specific. The chalone unit was defined as the amount of hormone needed to obtain a 50% increase of DNA synthesis in liver slices during incubation for 2 hr at 37°C. The linear relationship between the amount of protein in a chalone preparation and (1/1-IF) where IF is the inhibited fraction of DNA synthesis, can be explained by an interaction of chalone molecules with receptor sites in the hepatocytes. These receptors apparently have low affinity for this hormone. The chalone may form a complex in the protein involved in the initiation of DNA replication; the complex could occur in the plasma membrane, preventing the initiation protein from reaching the nuclear membrane.

10024 EFFECTS OF INSULIN AND ADENOSINE 3',5'-MONOPHOSPHATE ON K^+ FLUX AND GLUCOSE OUTPUT IN PERFUSED RAT LIVER. (E.) Williams, T. F. (Vanderbilt U. Dept. Physiol., Nashville, Tenn.), J. H. Exton, N. Friedmann and C. R. Park. *Am. J. Physiol.* 221(6):1645-1651, 1971.

Glucagon, epinephrine or cyclic AMP stimulated a net influx of K^+ followed by a net efflux in the isolated rat liver perfused with nonrecirculating medium. The influx was immediate in response to cyclic AMP and was prominent at reduced temperature (27° C). When recircling medium was used in infusions, insulin alone reduced K^+ efflux and only the efflux phase of K^+ movement was observed. Insulin counteracted cyclic AMP-stimulated glucose efflux from the liver of fed rats in the presence of submaximal cyclic AMP concentrations but did not diminish the stimulatory effect of dibutryl cyclic AMP on K^+ or glucose efflux. Insulin apparently lowers the level of free cyclic AMP, that is, the small fraction of cellular cyclic nucleotide which is in contact with the regulatory systems for K^+ and glucose effluxes.

10025 CHANGES IN THE THYMUS DURING THE REGENERATIVE GROWTH OF THE LIVER AFTER

PARTIAL HEPATECTOMY IN RATS. (E.) Ertl, N. (City Hosp., Mannheim, Germany) and O. Wieser. *Oncology* 25(6):505-511, 1971.

The weight of the thymus gland and the incorporation rate of ^{3}H-labeled thymidine both decreased until the third day after partial hepatectomy in rats; then a phase of slower decrease or organ weight and incorporation of labeled DNA precursor followed with a nadir at the fifth day. A repopulation of the cortex of the thymus with small lymphocytes was completed at the ninth or tenth day. At one day and increasing until the third day after partial hepatectomy was the number of pyknotic nuclei of the thymocytes; very few mitoses were seen. After these changes the thymus cortex lost its predominant component, the small thymocytes, and was indistinguishable from the medulla. Large thymocytes and reticulum cells were not involved in this regressive process. The histologic picture of a complete repopulation of the thymus with small thymocytes was again to be seen between days 8 and 10 after the operation. Thymus involution was not an effect of rapid regenerative growth in liver, but a concomitant symptom of the limitation and the stop of the regenerative growth by adrenocortical hormones.

10026 THE EFFECT OF HEPATIC VENOUS OBSTRUCTION ON THE RATE OF FLOW OF BILE. (E.) Donovan, A. J. (U. Southern California Sch. Med., Los Angeles), M. A. Child and A. S. Masto. *Surg. Gynecol. Obstet.* 134(1):89-93, 1972.

In the 7 of 12 dogs which survived constriction of the suprahepatic portion of the vena cava, the mean bile flow increased from 10-14 ml/hr to 10-28 ml/hr. The concentration of bilirubin in the bile fell after hepatic venous obstruction in all 7 dogs, the decrease usually exceeding 100%. Hepatic venous obstruction apparently led to an increased bile water content without corresponding bilirubin increase (hydrocholeretic effect). The excessive flow of bile observed in cirrhotic patients is probably a reflection of the hepatic venous obstruction known to exist in such patients.

10027 STRUCTURAL AND FUNCTIONAL EFFECTS OF ETHANOL ON HEPATIC MITOCHONDRIA. (E.) Rubin, E. (Mt. Sinai Sch. Med., New York, N. Y.), D. S. Beattie, A. Toth and C. S. Lieber. *Fed. Proc.* 31(1):131-140, 1972.

Ethanol-induced morphologic damage and functional changes were studied in isolated hepatic mitochondria in rats. Chronic ethanol-treated rats incorporated one-third less leucine - ^{14}C in vitro into mitochondria. Chronic exposure to ethanol resulted in a persistent defect in mitochondrial membrane biogenesis and reduced the concentration of certain components of the electron-transport chain. Mitochondria obtained from rats treated with ethanol for 24 days exhibited depressed state 3 and state 4 respiration, although respiration remained coupled, ADP/O ratios being unchanged. The depression of succinate-linked respiration may be related to a reduced content of the flavoprotein (succinic dehydrogenase) or a lower cytochrome concentration in those mitochondria. Fatty acid oxidation was also depressed. In addition to metabolic alterations produced by increased redox potential resulting from alcohol metabolism, persistent damage to hepatic mitochondria may play a role in the pathogenesis of alcoholic liver injury.

10028 EFFECT OF ADRENAL AND HYPOPHYSEAL HORMONES ON THE DEVELOPMENT OF FATTY LIVER IN RATS FED OROTIC ACID. (E.) Hamuro, Y. (Takeda Chem. Indust. Ltd., Osaka, Japan). *Endocrinology* 90(1):200-206, 1972.

Feeding 0.5% or more orotic acid to intact rats caused a marked fatty liver and lowered the concentration of plasma triglycerides. The accumulation of lipid in livers was slightly lower in adrenalectomized rats than in ad libitum fat intact rats following orotic acid ingestion due, however, to reduction in food intake. Hypophysectomy completely prevented both fatty liver and plasma triglyceride reduction induced by a 1% orotic acid diet. A 3% orotic acid diet led to a marked depression of plasma triglyceride and phospholipid but no more increase in liver lipids. ACTH, growth hormone, or thyroxine, but not cortisol, when given to hypophysectomized rats on 1% orotic acid, produced fatty liver somewhat. Combined ACTH and growth hormone led to both fatty liver and reduced plasma triglycerides, demonstrable also in adrenalectomized, hypophysectomized rats. The coexistence of ACTH and growth hormone is required for the action of orotic acid on lipid metabolism.

10029 REDUCTIVE METABOLISM OF CORTICOSTERONE IN MICE: DIFFERENCES IN NADPH REQUIREMENTS OF LIVER HOMOGENATES OF MALES OF TWO INBRED STRAINS. (E.) Lindberg, M. (Stanford U. Med. Sch., Calif.), J. G. M. Shire, O. H. Doering, S. Kessler and R. B. Clayton. *Endocrinology* 90(1): 81-92, 1972.

^{3}H-Corticosterone metabolism was studied in liver homogenates from C57BL/10J and DBA/2J strains of mice with and without the addition of a NADPH-generating system. ^{3}H-Corticosterone was metabolized more efficiently to polar steroids in C57 homogenates, and its metabolism was more dependent upon exogenous NADPH in DBA strains. Both strains metabolized ^{3}H-corticosterone to either reduced ring A structures (tetrahydro-derivatives) or reduced both in ring A and at C-20 (hexahydro-derivatives). Of the derivatives, 3 beta, 5 alpha metabolites predominated in both strains, 3 beta-reduction and C-20 reduction being more active in the C57 strain. Reduction at C-20 gave almost exclusively 20 alpha-hydroxyl derivatives, mostly of the 3-beta, 5-alpha series.

NADPH addition stimulated the formation of products according to pre-existing patterns rather than leading to major changes in metabolic pathways. Interstrain differences observed in vitro were also present in the intact animal.

10030 EFFECT OF CHOLESTYRAMINE PARTICLE SIZE ON IN VITRO BINDING OF CONJUGATED BILE SALTS. (E.) Hagerman, L. M. (Mead Johnson Res. Ctr., Evansville, Ind.), D. A. Cook and D. L. Schneider. *Proc. Soc. Exp. Biol. Med.* 139(1): 248-253, 1972.

Cholestyramine (particle sizes of 10-30 μ or 50-75 μ in diameter) was incubated with 1.2-9.3 mM of the sodium salts of taurocholic acid, glycocholic acid, taurodeoxycholic acid or glycodeoxycholic acid in 0.3 M phosphate buffer at pH 6.0. In the larger particle size, cholestyramine showed a binding preference for taurine conjugates over glycine conjugates and for dihydroxy over trihydroxy bile salts. When the particle size was decreased to 10-30 μ, there was a more rapid saturation of the resin's binding sites with the dihydroxy bile salt, but no change in the binding with the trihydroxy salt. When partially hydrolyzed soybean oil was added to swine bile to expand the bile salt micelles and to simulate the intestinal milieu during fat digestion, reducing particle size again did not improve bile salt binding. Fatty acids hydrolyzed from soybean oil did increase binding of bile salt to all resins (including Amberlite XE-234 of particle sizes of 3-5 μ and 50-75 μ). Studies with human bile showed that all 4 resins efficiently bound bile salts and reduction in particle size did not appreciably affect binding. Analysis of the glycine-taurine ratio of the conjugated bile salts remaining unbound in the supernatant fluid indicated a preferential binding of taurine conjugates, since this ratio was increased from 1.9:1.0 in the untreated to 3.2:1.0 in cholestyramine-treated bile. Under these in vitro conditions there was essentially no binding of human biliary cholesterol to any of the resins.

10031 ROLE OF THE LIVER IN THE REGULATION OF PLASMA ANGIOTENSINOGEN AND RENIN LEVELS. (E.) Tateishi, H. (Cleveland Clin. Found., Ohio) and G. M. C. Masson. *Proc. Soc. Exp. Biol. Med.* 139(1):304-309, 1972.

The initial group of Sprague-Dawley rats was subjected to total hepatectomy alone or total hepatectomy, either preceded or followed by nephrectomy. Survival time was variable (usually 4-6 hr) and direct cannulation of the carotid artery showed that the operative procedures had little effect. Pre-operative partial constriction of the portal vein had no significant effect on plasma levels of angiotensinogen. Following hepatectomy alone, angiotensinogen fell rapidly below detectable levels, while this effect was partially prevented by nephrectomy. Plasma renin concentration was not significantly altered by partial constriction of the portal vein. With hepatectomy alone, there was a 100-fold increase in renin concentration above control levels, and the extent of this increase was not related to survival time. These high increases were prevented by nephrectomy. Sham hepatectomy or nephrectomy had little effect on angiotensinogen, and levels in partially hepatectomized rats were not significantly different from those in either of these 2 groups because of large variations. In partially hepatectomized rats, nephrectomy increased angiotensinogen levels. There was also a significant increase in plasma renin in these partially hepatectomized rats. In rats receiving s.c. CCl_4 (either one daily injection of 0.2 ml or 0.3 ml during 2 days), there was a dose-dependent decrease in angiotensinogen, which was significant with both doses. The effects of nephrectomy were not altered by CCl_4, while this agent had little effect on plasma renin concentration.

10032 HISTOCHEMICAL EVIDENCE OF A CHOLESTATIC PERIOD IN NEONATAL RATS. (E.) De Wolf-Peeters, C. (St. Rafael Acad. Hosp., Leuven, Belgium), R. De Vos and V. Desmet. *Pediatr. Res.* 5(12):704-709, 1971.

During the fetal period (studied from day 14) peculiar plump canalicular structures with a positive alkaline phosphatase reaction became longer and more numerous with a maximal development at days 18 and 19 of gestation. Just before birth (day 20) and during the first 12 hr after birth, these larger structures disappeared and the whole liver lobule was negative. However, after 12 hr, large, irregular canalicular structures with no general portal-centrilobular orientation were found and the liver lobule was alkaline phosphatase-positive. The staining pattern returned gradually to normal by day 10. This change resembled different cholestatic conditions seen in adult rat tissue. From the sixth hr to the second day accumulations of conjugated bilirubin were observed. In animals born to dams subjected to bile duct ligation 2 days before delivery, a similarly abnormal alkaline phosphatase picture was seen at birth, whereas no bilirubin was visualized. Apparently there exists a cholestatic phenomenon in early neonatal life presumably caused by temporary immaturity of the liver secretory function. The neonatal sequence of changes can be accelerated by enforcing a secretory load upon the fetal liver.

10033 THE EFFECT OF METHYL METHANESULPHONATE ON THE LEVELS OF HEPATIC GLYCOGEN IN THE RAT. (E.) Pillinger, D. J. (Christie Hosp., Manchester, England). *Life Sci.* [*II*] 10(24): 1405-1414, 1971.

The level of rat hepatic glycogen decreased rapidly to less than 10% control level, within

24 hr after a single i.p. injection of methyl methanesulfonate. In fasting rats, the onset of glycogen depletion was evident within 10 min after i.p. methyl methanesulfonate administration. By 3 hr the level had dropped to 25% control and by 18 hr, hepatic stores of glycogen had been dissipated. When feeding was recommended after 24 hr, in comparison with the rapid return to pretreatment level after fasting alone, a slow accumulation of polysaccharide occurred. The extent of glycogen depletion was directly related to the dose of alkyl ester injected. Prior treatment of animals with methyl methanesulfonate prevented cortisone-induced synthesis of glycogen and further synthesis was blocked when given following steroid induction. The effect observed with this alkyl ester resembles the inhibition of protein synthesis achieved by puromycin or ethionine injection.

10034 CHOLERETICS AND BILIARY EXCRETION OF ANTIBIOTICS IN RATS. (E.) Coppi, G. (De Angeli Inst., Milan, Italy), L. Monti and R. Genova. *Chemotherapy* 16(6):345-355, 1971.

During the 2 hr after administration of the choleretics (various routes) to rats, the most active drug is dehydrocholic acid followed by α, α-diethyl-1-naphthylacetic acid, and α-methyl-α-(2-morpholinoethyl) 1-naphthylacetic acid. Both the naphthylacetic acid drivatives (DA808 and DA1627, resp.) showed longer-lasting activity. Unlike dehydrocholic acid, DA808 and DA1627 did not decrease the concentrations of penicillins and tetracycline in the bile. DA808 and DA1627 had no influence on demethylchlortetracycline and rifamycin. The use of hydrocholeretic agents (dehydrocholeretic acid) reduced the concentrations of antibiotics in the bile, whereas the use of true choleretic drugs does not generally alter the level of chemotherapeutic agents in the bile.

10035 THE ABILITY OF HUMAN BILE SALTS AND LECITHINS EXTRACTED FROM HUMAN BILE TO DISSOLVE SUPERMOLECULAR PARTICLES OF CHOLESTEROL. (Fr.) Montet, J. C. (INSERM Res. Unit Dig. Pathol., Marseilles, France) and D. G. Dervichian. *Biochemie* 53(6-7):751-754, 1971.

The maximal *in vitro* incorporation of purified cholesterol into a mixture of conjugated human bile salts and lecithins extracted from human bile occurred when the molar ratio of bile salts to lecithin was of the order of 7:3. Similar results were obtained when conjugated bovine bile salts were substituted, with cholate alone, and with lecithin derived from egg yolk, appearing to confirm that such incorporation was not affected by the relative amounts of palmitic, stearic, oleic and/or linoleic acids present in the lecithin, as long as the overall percentage of unsaturated fatty acid chains was approximately the same.

10036 ELECTRON MICROSCOPIC STUDIES OF THE LIVER IN THE PRESENCE OF EXPERIMENTALLY-INDUCED CHOLESTASIS. (Ger.) Balász, M. (Inst. Med. Education, Budapest). *Exp. Pathol.* 5(5/6): 275-285, 1971.

A study was made of the temporal sequence of electron microscope changes in rat livers, following ligation and section of the common bile duct. During the first 2 weeks, pathologic changes appeared to be limited to the intracellular secretory apparatus, including the biliary capillaries, the pericanalicular regions and the Golgi apparatus, with the rest of the substructure remaining intact. This was accompanied by a significant increase of the number of lysosomes, both in the immediate vicinity of the biliary capillaries and throughout the cytoplasm as a whole. During weeks 3-6, substructural changes were extended to other parts of the cell, accompanied by extensive, progressive cell damage throughout the liver and culminating in marked proliferation of new ductules, "capillarization" of the sinusoids (probably due to anoxia), and formation of an abnormal, superficial cellular membrane which showed both secretory and resorptive activity.

10037 ACCELERATED BILIARY THYROXINE SECRETION IN RATS TREATED WITH 3-METHYLCHOLANTHRENE. (E.) Newman, W. C. (Tulane U. Med. Sch., New Orleans, La.), R. C. Fernandez, R. M. Slayden and R. C. Moon. *Proc. Soc. Exp. Biol. Med.* 138(4): 899-900, 1971.

Female rats received a single dose of 10 mg of 3-methylcholanthrene followed in 24 hr by 0.5 µCi of ^{131}I-labeled L-thyroxine. Controls did not receive the carcinogen. Bile was then collected every hr for 4 hr. Average total biliary excretion for the methylcholanthrene-treated rats was twice that of the controls. Average volume flow did not vary significantly for the treated and the controls. In the carcinogen-treated rats, the biliary clearance of radioactive thyroxine, was more than 3 times that of the controls. The major fraction of biliary ^{131}I, in both groups, was T$_4$-glucuronide. The accelerated biliary secretion in the carcinogen-treated rats suggests that the presence of a greater quantity of T$_4$-glucuronide enhanced the mechanism. The bile flow rate increase in treated rats could not account for the difference in biliary iodine secretion. It is postulated that the carcinogen stimulated biliary secretion of T$_4$-glucuronide by increasing liver glucuronyl transferase. A generalized enzyme system response to methylcholanthrene, involving drug metabolism as well as hormone metabolism, may exist.

10038 THE ACUTE EFFECT OF ALCOHOL ON HEPATIC COENZYME A AND ACETYL CoA CONCENTRATIONS.

(E.) Breen, K. J. (Vanderbilt U. Sch. Med., Nashville, Tenn.), J. Shaw, J. D. Levinson and S. Schenker. *Proc. Soc. Exp. Biol. Med.* 138(4): 1096-1100, 1971.

Rats and mice were given alcohol loads by various routes and then at selected time intervals, hepatic Coenzyme A (CoA) and acetyl-Coenzyme A concentrations were determined and correlated with blood alcohol levels. The results indicate that acutely administered ethanol did not alter hepatic pyruvate decarboxylase activity or hepatic CoA content and resulted in a normal or somewhat increased acetyl CoA concentration in the liver. The acute depressive effect of alcohol on the hepatic citric acid cycle seems to be mediated by an as yet imprecisely elucidated site. Acetaldehyde, directly given and compared with disulfiram controls, failed to influence the hepatic CoA concentration. The measurement of acute effects of alcohol ruled out the effects of varying concentrations of CoA and acetyl CoA on the citric acid cycle. Care was taken to administer a total volume dose of 1 ml to rats and 0.4 ml to mice.

10039 SYNERGISTIC EFFECT OF CORTISOL AND GROWTH HORMONE ON HEPATIC ORNITHINE DECARBOXYLASE ACTIVITY. (E.) Richman, R. A. (U. North Carolina Sch. Med., Chapel Hill), L. E. Underwood, J. J. Van Wyk and S. J. Voina. *Proc. Soc. Exp. Biol. Med.* 138(4):880-884, 1971.

The conversion of ornithine to putrescine is catalyzed by ornithine decarboxylase and is thought to be the rate-limiting step in the synthesis of polyamines. This report describes studies in which ornithine decarboxylase activity was measured in livers of intact, hypophysectomized, and adrenalectomized rats and characterizes the hormonal control of hepatic ornithine decarboxylase activity in the rat. Results indicate that hepatic activity is strikingly stimulated by hydrocortisone in both hypophysectomized and adrenalectomized rats. Growth hormone caused a significant increase after 3 hr, then activity plateaued and fell to basal levels by 10 hr. Hypophysectomy lowered basal levels but adrenalectomy did not. Simultaneous administration of growth hormone and hydrocortisone increased the activity more than the sum of the increase of the separate hormone. In the hypophysectomized animal, pharmacologic doses of testosterone, epinephrine, insulin, L-thyroxine, estradiol, and glucagon produced only minor effects on enzymatic activity.

10040 BINDING OF BROMOSULPHTHALEIN SODIUM BY HUMAN SERUM ALBUMIN USING A CONTINUOUS DIAFILTRATION TECHNIQUE. (E.) Crawford, J. S. (Birmingham Matern. Hosp., England), R. L. Jones, J. M. Thompson and W. D. E. Wells. *Br. J. Pharmacol.* 44(1):80-88, 1972.

Detailed binding isotherms of equilibrium solution concentration of bromsulphthalein (BSP) versus the number of molecules of BSP bound per molecule of human serum albumin have been obtained using an ultrafiltration-cum-dialysis technique. Pure human serum albumin solutions with albumin concentration of 1.59 g%, 2.31 g% and 3.39 g% and 3 dilutions of pooled human serum with albumin concentration of 1.45 g%, 2.29 g% and 2.85g% in 310 ideal milliosmolar phosphate buffer at pH 7.4 and at 22° C were used. The binding capacity of pure human serum albumin at total bound and free BSP concentration below 2.3 mM is greater than that of the pooled serum at an equivalent albumin concentration. It is postulated that binding sites may be bound by more strongly binding ligands. At total BSP concentrations greater than 2.3 mM, the binding capacity of pure albumin is less than that of pooled serum at an equivalent albumin concentration. This may be due to the presence of other non-ultrafilterable serum materials capable of binding BSP. Qualitative analysis of the isotherms indicates that there is competition between the polymerization of the albumin to dimers and high oligomers and the binding of BSP by albumin. The binding behavior of BSP in serum resembles that of albumin because molar binding capacity is some function of dilution but varies due to the presence of other substances and competition.

10041 PROBLEMS OF LIVER TRANSPLANTATION IN SWINE. (Ger.) Hell, E. (Ludwig Boltzmann Inst. Exp. Surg., Salzburg, Austria), O. Boeckl and G. Zimmermann. *Z. Exp. Chir.* 4(5):295-299, 1971.

Following liver transplantation in the absence of immunosuppressive medication, 23 of 45 pigs survived for more than 48 hr. The longest survival was 7 weeks. Both SGOT and sorbitol dehydrogenase levels were increased postoperatively in the animals which failed to survive for 48 hr. Described in detail are the techniques employed for endotracheal intubation, minimizing the effects of ischemia during transfer of the donor liver, creating a splenojugular shunt (required for swine, but not for dogs or humans), avoiding outflow block, and reconstructing biliary pathways.

10042 ULTRASTRUCTURAL MORPHOMETRIC STUDIES OF THE PARENCHYMAL CELLS OF RAT LIVERS FOLLOWING ACUTE INTOXICATION BY ALCOHOL. (Ger.) Rohr, H. P. (U. Basel Pathol. Inst., Switzerland), H. J. Michel and L. Bianchi. *Pathol. Eur.* 6(3): 322-341, 1971.

Morphometric studies made at intervals up to 12 hr after a single dose of 40% alcohol solution (6 g/kg, intragastrically) showed a significant, progressive increase of the mean volume density of the mitochondria of rat liver parenchymal cells, the mean surface area of the external mitochondrial membrane, and the mean surface area of the cristae, with no increase of the density of the mitochondrial matrix or the mean surface area of the cristae per unit of mitochondrial volume. The mean total number of mitochondria per hepatocyte was also increased significantly, confirming an adaptive proliferative process, rather than simple mitochondrial swelling. This conclusion was further supported by a highly significant increase of the surface density of smooth endoplasmic reticulum, reflecting increased microsomal enzymatic activity. A 7-fold increase of the mean volume density of fat vacuoles by the twelfth hour after medication indicated the degree to which alcohol interferes with the ability of liver cells to metabolize fats.

10043 INCREASE OF SOME RAT LIVER MICROSOMAL ENZYMES AS A CONSEQUENCE OF PROLONGED ALCOHOL INTAKE: COMPARISON WITH THE EFFECT OF PHENOBARBITONE. (E.) Idéo, G. (U. Milan Inst. Med. Pathol., Italy), R. de Franchis, E. Del Ninno, C. Cocucci and N. Dioguardi. *Enzyme* 12(4): 473-480, 1971.

The effect of ethanol (3 g/kg/day) and phenobarbitone (60 mg/kg/day) on 4 hepatic microsomal enzymes, *i.e.* aryl hydroxylase, nitrate reductase, UDP-glucosomyltransferase, and the microsomal ethanol-oxidizing system was studied in male Wistar rats. Aryl hydroxylase and UDP-glucosomyltransferase were markedly increased in whole homogenates and in washed microsomes from rats given either ethanol or phenobarbitone. Nitrate reductase was also increased, but the increases were more significant in washed microsomes than in whole homogenates. The oxidizing system was greatly increased in rats given ethanol, while it was unchanged in those given phenobarbitone. Thus the only significant difference in enzyme induction by ethanol and phenobarbitone was in the microsomal ethanol-oxidizing system.

10044 EFFECT OF CHRONIC ETHANOL FEEDING ON BILE FORMATION AND SECRETION OF LIPIDS IN THE RAT. (E.) Boyer, J. L. (Yale U. Sch. Med., New Haven, Conn.). *Gastroenterology* 62(2):294-301, 1972.

Male Sprague-Dawley rats were pair-fed a daily liquid formula diet containing 18% of total calories as protein and 35% as fat for 4 weeks. One rat from each pair received a diet containing 36% of calories as ethanol, starting with a 3-g ethanol/100 ml diet on days 1 and 2, then a 4-g/100 ml diet on days 3 and 4, and continuing with a 5 g/100 ml diet from day 5 on. Dextri-Maltose was isocalorically substituted for ethanol and pair-fed to controls twice a day. At the time of study, the bile duct was cannulated and bilateral nephrectomies were performed to maintain fluid balance and avoid loss of isotopes. Estimates of canalicular flow were obtained after injection of ^{14}C-erythritol into the inferior vena cava. After cannulation, bile was collected before and after infusion of sodium taurocholate (40 µmoles/hr). Compared with controls, alcohol-fed rats showed an increase in weight of the liver, hepatic triglyceride levels, in 2-hour bile volumes and in bile secretion before and after infusion of taurocholate. The similarity of the clearance of erythritol and the rate of bile formation confirmed that bile was formed at the canaliculus in ethanol as in normal rats. Rats fed ethanol showed no changes in the bile phospholipid:cholesterol ratio or in the relative proportions of biliary cholesterol, lecithin, or bile salts. All alcohol-fed rats showed microscopic evidence of fatty infiltration of the liver.

10045 THE EFFECTS OF PREGNANCY ON BILIARY LIPIDS IN RHESUS MONKEYS. (E.) Martin, D. E. (Georgia State U. Sch. Allied Health Sci., Atlanta), R. C. Wolf and R. K. Meyer. *Proc. Soc. Exp. Biol. Med.* 139(1):115-117, 1972.

Peripheral blood and gallbladder bile (at laparotomy) were obtained from rhesus monkeys before pregnancy, during weeks 5, 9, 13, 17 and 21 of gestation and 1 month postpartum. In control samples, biliary cholesterol levels were more than twice as high as plasma levels, while phospholipids and total lipids were concentrated more than 13-fold. Compared with nonpregnant monkeys, plasma cholesterol levels were significantly decreased at weeks 9, 13 and 17 of pregnancy, while biliary cholesterol levels were not significantly altered at any of these times. At weeks 9 and 13, plasma phospholipid levels were decreased, while biliary phospholipid levels were not changed. At weeks 9, 13 and 17, plasma total lipids were also decreased, while biliary lipid levels again remained unchanged. The data show that, during pregnancy in these rhesus monkeys, there is no increase in biliary lipid concentrations, and it suggested that the decreased plasma levels of these moieties may be secondary to an increased bile volume due to increased production and flow with no change in biliary lipid concentration.

10046 MEDIATOR OF HEPATIC AMINO ACID FLUX IN INFECTED RATS. (E.) Wannemacher, R. W., Jr. (US Army Med. Res. Inst. Infect. Dis., Frederick, Md.), R. S. Pekarek and W. R. Beisel. *Proc. Soc. Exp. Biol. Med.* 139(1):128-132, 1972.

Fisher Dunning rats were inoculated with either live *Diplococcus pneumoniae*, type I, strain A5; heat-killed *D. pneumoniae*; 100 µg lipopolysaccharide from *E. coli* 0127:B8; or 100 µg of crystalline homopolymeric duplex of polyinosinic acid and polycytidylic acid or polyadenylic and polyuridylic acid. Only the live bacteria significantly increased the liver cycloleucine content over saline controls at 6 and 9 hr after inoculation. At 3, 6 and 9 hr, all except the heat-killed bacteria reduced serum zinc levels below controls and this effect was maximal between 6 and 9 hr. Body temperature was elevated in rats injected with live bacteria or either polymer, with maximal effect between 6 and 9 hr. Sterile serum from rats inoculated with live bacteria 2 hr before sacrifice produced a significant increase in hepatic cycloleucine and a marked decrease in serum zinc when injected i.p. in recipient rats who were studied 3 and 6 hr later; the cycloleucine effect was maximal at 3 hr, the zinc effect at 6 hr. An i.p. injection of crude endogenous mediator (released into saline by rat peritoneal WBC and containing 280 µg/ml of protein) caused an increase in hepatic cycloleucine compared with saline controls; this increase appeared within 1 hr, increased logarithmically over the next 2 hr, and was still elevated at 6 hr. At 3 hr, the accumulation of hepatic cycloleucine was proportional to the logarithm of a dose of WBC mediator within the range of 30-100 µg of protein; no further increase was seen with a dose of 100-300 µg of mediator protein. No alteration of hepatic cycloleucine was seen with heat-treated mediator or control WBC homogenate.

10047 HEPATIC HOMEOSTASIS OF PLASMA L-ASPARAGINE. (E.) Woods, J. S. (Yale U. Sch. Med., New Haven, Conn.) and R. E. Handschumacher. *Am. J. Physiol.* 221(6):1785-1790, 1971.

In in vivo experiments, pentobarbital-anesthetized Sprague-Dawley rats were infused i.v. with 0.15 M solutions of L-asparagine or L-aspartic acid by femoral vein cannulas and carotid arterial samples were withdrawn at 15- or 30-min intervals. The initial plasma L-asparagine level of about 40 µM increased to 500 µM after 30 min of infusion at 5 µmoles/min; the maximum plateau was 600 µM at this infusion rate and 700 µM at 14 µmoles/min. After termination of the 2-hr infusion, levels dropped to near normal within 15 min. Plasma L-aspartic acid was unchanged during infusion of L-asparagine. With infusion of L-aspartic acid, levels reached 240 µM at 30 min, and 310 µM at 120 min and were near normal within 15 min of termination of infusion; levels of L-asparagine remained essentially unchanged. Pretreatment of rats i.p. with decaborane (20 mg/kg) or with fluoroacetate (40 mg/kg) caused an accumulation of L-aspartic acid during infusion with L-asparagine. During infusion with L-asparagine at 5 µmole/min, biliary L-asparagine rose from a control of 52 µM to 82 µM during the 60- to 90-min interval, while plasma levels increased from 25 to 450 µM. When isolated rat livers were perfused with blood containing 50, 100 or 200 µM L-asparagine, efferent blood levels were reduced to 20 µM within 2-3 hr, while livers perfused with blood containing no L-asparagine added L-asparagine to the efferent blood to reach a steady concentration of 20 µM.

10048 EFFECT OF LASIOCARPINE ON AFLATOXIN B_1 CARCINOGENICITY IN RAT LIVER. (E.) Reddy, J. K. (U. Kansas Med. Ctr., Kansas City) and D. Svoboda. *Arch. Pathol.* 93(1):55-60, 1972.

Male inbred Fisher-344 strain rats received either aflatoxin B_1 alone (at a concentration of 2 parts/1,000,000 in the diet) or lasiocarpine alone (by i.p. injection in a dose of 7.8 mg/kg twice weekly for 4 weeks and then weekly for 52 weeks) or both aflatoxin B_1 (as above in the daily diet) and lasiocarpine (7.8 mg/kg twice weekly for 2 weeks before beginning the aflatoxin diet and then twice weekly for 2 more weeks followed by weekly injections for 18 weeks). In rats receiving aflatoxin B_1 alone the changes were as reported previously and by 14 weeks, 85% of 20 rats had developed 2 or more hepatic tumors greater than 0.5 cm in diameter. Histologically the tumors were well- to moderately-differentiated hepatocellular carcinomas showing trabecular and adenomatous patterns in areas. In rats receiving both agents, early changes were more pronounced than with either alone. By week 6 there was focal liver cell necrosis, proliferation of oval cells and bile ducts and increased portal fibrosis, while by week 10 there were changes of postnecrotic cirrhosis and regenerative nodules of variable size surrounded by parenchyma consisting of megalocytes and oval cells. The nodules with large, hyperplastic cells were thought to develop into hepatocellular carcinomas seen in 16 of 19 rats at 18 weeks. These tumors were associated with well-developed postnecrotic cirrhosis or advanced portal scarring, both absent in the aflatoxin-only rats. The changes in lasiocarpine-only rats were as described with a mild degree of portal fibrosis and oval cell proliferation. No evidence of carcinogenesis was seen after 1 yr.

10049 STUDY OF MECHANISM OF AUTOREGULATORY SYSTEM OF CORTICOSTEROID METABOLISM IN LIVER. (E.) Uete, T. (Kitano Hosp. Tazuke Kofukai Med. Res. Inst., Osaka City, Japan) and H. Tsuchikura. *Metabolism* 21(1):77-85, 1972.

Levels of nonprotein- and protein-bound corticosteroids were measured in human serum and in vitro in rat liver slices and in the surrounding incubation medium. In both in vivo and in vitro studies there was a direct relationship between increases in blood levels of both fractions of corticosteroids and increased hepatic metabolism of corticosteroids. High blood levels of nonprotein-bound corticosteroids were accompanied by an increased rate of hepatic metabolism of corticosteroids in contrast with low serum levels. Hepatic metabolism of the nonprotein-bound fraction of the corticosteroids was more rapid than that of the protein-bound fraction. Under physiologic conditions when the capacity of serum proteins to bind steroids was not saturated, there was a proportionally greater amount of protein binding of steroids and a proportionally lesser amount available for hepatic metabolism than at higher serum levels.

10050 EFFECT OF CHOLESTYRAMINE ON COMPOSITION OF DUODENAL BILE IN OBESE HUMAN SUBJECTS.

(E.) Wood, P. D. (Stanford U. Sch. Med., Calif.), R. Shioda, D. L. Estrich and S. D. Splitter. *Metabolism* 21(2):107-116, 1972.

Subjects consisted of 4 obese patients (3 female) with normal serum lipid levels who were hospitalized in a metabolic ward for 58-144 days in a weight-losing program during which time they received a 1200 calorie/day constant liquid formula diet. One had mild diabetes well controlled with oral agents and all had normal biliary tracts with the exception of one with a nonvisualizing gallbladder. After a few days on the diet each received a slow i.v. infusion tracer dose of purified 4- ^{14}C-cholesterol. Each then underwent 1 or more 4-week periods of treatment with 4 g/day p.o. cholestyramine alternating with periods of no treatment or with placebo. At intervals fasting duodenal bile samples were obtained by intubation and i.v. cholecystokinin. The proportion of primary (hepatic synthesized) cholic acid increased from 38.0% to 67.3% and that of primary chenodeoxycholic acid decreased from 37.4% to 26.1%; the secondary (bacterially modified) deoxycholic acid decreased from 25.0% to 6.6%. These changes are attributed mainly to the cholestyramine-induced increase in rate of hepatic bile acid synthesis. There was also a significant increase in the ratio of glycine-conjugated/taurine-conjugated bile acids from 2.7% to 7.3%, such that glycocholic acid became the predominant conjugated bile acid. During the treatment, plasma lipid levels fell 8-37%, which was reversed upon withdrawal of the drug.

10051 PRECURSORS OF PLASMA TRIGLYCERIDE FATTY ACID IN HUMANS. EFFECTS OF GLUCOSE CONSUMPTION, CLOFIBRATE ADMINISTRATION, AND ALCOHOLIC FATTY LIVER. (E.) Barter, P. J. (Australian Natl. U. John Curtin Sch. Med. Res., Canberra), P. J. Nestel and K. F. Carroll. *Metabolism* 21(2):117-124, 1972.

Subjects initially received a long constant rate infusion with ^{14}C- and ^{3}H-labeled palmitic acid to ensure that the plasma triglyceride fatty acid in very low density lipoproteins had an opportunity to fully equilibrate with all the precursors. With attainment of this constant level, the ratio of the specific activity in very low density lipoprotein triglyceride fatty acid to that in plasma free fatty acid served as a measure of the contribution of plasma free fatty acid to triglyceride fatty acid. This ratio was 0.8 : 1.0 in 1 healthy volunteer and in 2 patients with Type IV hyperlipidemia, and was less than 0.5 in 5 alcoholics with fatty infiltration of the liver. In 3 males treated for about 3 yr with 2 g/day of clofibrate for mixed hyperlipidemia and coronary artery disease, the ratio was less than 0.4; 8 weeks after cessation of therapy with clofibrate the ratio was 0.8. In 3 normals undergoing a sustained period of glucose consumption the ratio was 0.3 to 0.6. Simultaneous infusion of ^{14}C-U-glucose in 2 normals showed that, in the absence of ^{14}C in the free fatty acids, 0.8 of this label appearing in plasma triglyceride was in triglyceride free fatty acid. This incorporation of ^{14}C from glucose into triglyceride fatty acid persisted for 12 hr after the last meal in these carbohydrate-loaded subjects, while in normals not subjected to carbohydrate loading, the label from the glucose appeared only in the glycerol moiety of plasma triglyceride. It is concluded that in normals on normal diets the neosynthesized postabsorptive triglyceride fatty acid is derived primarily from plasma free fatty acid, while hepatic lipogenesis occurs to a significant extent during glucose consumption. In alcoholics and patients on clofibrate therapy, stored hepatic fatty acids provide a significant source of plasma triglyceride fatty acid.

10052 HEPATIC ULTRASTRUCTURAL EFFECTS OF CHOLIC ACID OVERLOAD. (E.) Witzleben, C. L. (St. Louis U. Dept. Pathol., Mo.). *Exp. Mol. Pathol.* 16(1):47-53, 1972.

Cholic acid was infused i.v. into male rats at a rate of 1/3 ml/min. (total 10 ml. of solution) and hepatic ultrastructural changes were studied. Bile flow rate increased 50-100% after cholic acid infusion. Light microscopic changes were minimal with some tendency for a loss of the normal hepatocyte basophilia and in some animals scattered hepatocytes were seen with shrunken, dark nuclei and increased cytoplasmic eosinophilia. The most constant and striking changes involved the mitochondria, which showed rounding and a decrease in the number of cristae. Mitochondria were readily found which were completely transversed by a double membrane, the elements of which were continuous with the inner limiting membrane of the organelle. The endoplasmic reticulum showed a striking approximation of envelopes to mitochondria, and in some cases, individual mitochondria were completely circled by endoplasmic reticulum. In addition, many hepatocytes contained large numbers of liposomes. Thus, cholic acid overload causes significant structural changes in rat hepatocytes.

10053 ULTRASTRUCTURAL AND BIOCHEMICAL ALTERATIONS OF RAT HEPATOCYTES PRODUCED BY CHRONIC PROTEIN DEFICIENCY AND RE-ALIMENTATION. (E.) Dempo, K. (Sapporo Med. Coll., Japan). *Sapporo Igaku Zasshi (Sapporo Med. J.)* 38(3-4): 61-82, 1970.

The effects of chronic protein deficiency and re-alimentation on the ultrastructure and biochemistry of hepatocyte organelles were studied in male Wistar rats. With both light and electron microscopy there were little differences in the structure of hepatocytes of animals on protein-free and protein-deficient (4%) diets. Principal alterations of the hepatocytes were marked atrophy with a decrease in the number of organelles, an irregular outline of the cytoplasmic membrane and a marked decrease in distance between the neighboring cell nuclei. Most of the hepatocytes contained a large amount of glycogen and lipid in the cytoplasm which was mobilized and reduced after re-alimentation. There was also poor development of the lamellar arrangement of rough endoplasmic reticulum and smooth endoplasmic reticulum and a decrease in the number of mitochondria and polysomes; as well as nuclear inclusions and nucleolar enlargement. The Golgi apparatus, however, frequently showed considerable hypertrophy occupying the pericanalicular regions with vacuolation of cisternae containing some electron-dense amorphous substances. Numerous lysosomes with various shapes were frequently observed in the vicinity of the Golgi apparatus. The intracytoplasmic membranes showed a marked fragility as indicated by the appearance of partial defect of the outer mitochondrial membrane, mitochondriolysis, and an increased availability of lysosomal enzyme (acid phosphatase) in biochemical assay. The amount of DNA increased remarkably by the feeding of a protein-free diet, and recovered rapidly toward normal after re-alimentation. After re-alimentation, the cytoplasmic organelles showed recovery and the nuclear inclusions were no longer present.

10054 EFFECT OF ETHIONINE ON HEPATIC POLYRIBOSOMES AND PROTEIN SYNTHESIS. STUDIES DEALING WITH THE ACUTE ADMINISTRATION OF ETHIONINE TO FASTED OR FED MICE OR TO RATS FED A DIET CONTAINING ETHIONINE. (E.) Sidransky, H. (U. Pittsburgh Sch. Med., Pa.), D. S. R. Sarma and E. Verney. *Exp. Mol. Pathol.* 15(3):320-335, 1971.

Ethionine administered i.p. to overnight fasted female mice led to polyribosomal disaggregation, decreased in vitro protein synthesis and a marked decrease of ATP of the livers. In nonfasted animals ethionine caused greater polyribosomal aggregation, increased in vitro protein synthesis and a moderate decrease in hepatic ATP content. While the female rats fed the basal diet and then treated with ethionine showed marked inhibition of hepatic protein synthesis in vitro, decreased ATP content and marked hepatic polyribosomal disaggregation, the rats fed the ethionine diet and then treated with ethionine showed neither protein synthesis inhibition nor polyribosomal disaggregation. The adaptive response of the rat livers was reversible, since rats fed the ethinione diet for 21-31 weeks and then switched to the basal diet for 5-12 weeks responded to an acute administration of ethionine with inhibited hepatic protein synthesis and disaggregation of polyribosomes. The adaptive response by liver cells to toxic agents may occur in a variety of ways through factors which influence directly or indirectly the transcriptional or translational control of polyribosomes.

10055 COMPARISON OF ETHYLENE DIBROMIDE AND CARBON TETRACHLORIDE TOXICITY IN RATS AND CHICKS: BLOOD AND LIVER LEVELS; LIPID PEROXIDATION. (E.) Nachtomi, E. (Volcani Inst. Agric. Res., Rehovot, Israel) and E. Alumot. *Exp. Mol. Pathol.* 16(1):71-78, 1972.

The pool size was the same for ethylene dibromide and carbon tetrachloride (CCl_4) in rat liver, but the rate of elimination of the former from both liver and blood was 4 times greater than that of the latter, indicating an efficient detoxification mechanism of ethylene dibromide. The ethylene dibromide pool size in chicks was 7 times that of carbon tetrachloride, but the elimination was similar. The liver pool size of CCl_4 in rats was 17 times that in chicks, while ethylene dibromide was only twice that observed in chicks. Different hepatotoxic effects of the 2 species, particularly the resistance of chicks to CCl_4 may be explained by ethylene bromide and CCl_4 levels and elimination rates. In rats, liver triglycerides were increased and conjugated double bond (diene) formation in microsomal liver lipid was observed after ethylene dibromide treatment; diene formation was doubled in CCl_4-treated rats. No poison caused diene formation in chick liver lipids; no relationship was observed between degree of haloalkane toxicity and formation of conjugated double bonds in liver microsomal lipids.

10056 ULTRASTRUCTURAL STUDIES ON THE EFFECT OF CHOLINE OROTATE ON GALACTOSAMINE INDUCED HEPATIC INJURY IN RATS. (E.) Scharnbeck, H. (Mt. Sinai Sch. Med., New York, N. Y.), F. Schaffner, D. Keppler and K. Decker. *Exp. Mol. Pathol.* 16(1):33-46, 1972.

Diffuse hepatocellular damage was seen 25 hr after D-galactosamine administration. Changes included cell ballooning, condensed cells, glycogen depletion, autophagic vacuoles, increased liposomes, diminished rough endoplasmic reticulum and hypertrophied smooth endoplasmic reticulum. In rats, 24 hr after galactosamine, and 49 hr after the first choline orotate (pretreatment) injection, the above changes were observed, but to a less severe degree and not in all cells. Chief differences were the absence of smooth endoplasmic reticulum hypertrophy and the formation of glycogen containing lysomes. Those animals receiving choline orotate and galactosamine simultaneously showed more hepatocellular fat than with either agent alone; fat droplets of varying size were present within the Golgi apparatus and within the Disse spaces. Orotic acid causes ineffective coupling of lipids with the acceptor protein while in galactosamine-induced hepatic injury more likely defective protein or lipoprotein synthesis is the main cause.

10057 STUDIES ON EXPERIMENTALLY INDUCED ALLERGIC HEPATITIS. (Ger.) Roman, E. (Bucharest Med. Sch., Rumania) and M. Saragea. *Allerg. Asthma (Leipz.)* 16(6):213-221, 1971.

Homogenates from auto-, homo- and heterologous livers, liver cell fragments and mitochondria, cytotoxic sera and sera from patients with viral hepatitis were tested by different immunization schedules for antigenicity in guinea pigs, rabbits, rats and dogs. Histopathologic changes in the liver were regarded as allergic in origin (circumscribed necroses, periportal round cell infiltration, Kupffer cell reactions). Pathologic liver function tests and a variety of immunologic tests showed that an allergic hepatitis can be induced by various liver fractions. Best results were obtained with rats and guinea pigs. Heterologous liver was more antigenic than homo- or autologous liver tissue. The most antigenic fraction was located above the mitochondria after centrifugation, (probably microsomes or ribosomes). The various immunologic tests indicate the existence of both the delayed and immediate type of autoimmune reaction, and the presence of cellular as well as humoral antibodies.

10058 ULTRASTRUCTURE OF LIVER CELLS IN RABBITS IN SUBACUTE BENZENE POISONING. (Pol.)

Jonek, J. (Slask Med. Acad. Histol. and Embryol. Dept. Zabrze, Poland), M. Kaminski, H. Grzybek and B. Panz. *Patol. Pol.* 22(4):641-651, 1971.

Male rabbits weighing 2.5 kg were exposed to benzene vapor (10 mg/liter), 6 hr per day for 2 weeks. Electron microscope examination of the liver cells revealed significant structural changes. These included marked hypertrophy of the smooth endoplasmic reticulum (tubular type), decrease in glycogen granules, disappearance of ergastoplasm, irregular distribution and loss of ribosomes, degenerative changes in mitochondria and a segregation of the granular and fibrous components of some nucleoli.

10059 EXPERIMENTAL STUDIES ON THE INFLUENCE OF PENICILLIN AND STREPTOMYCIN ADMINISTERED DURING PREGNANCY ON THE LIVER OF WHITE RAT FETUSES. (Pol.)

Stokłosa, E. (Slask Med. Acad. Zabrze, Poland), S. Kośmider, A. Brzegowy and G. Mikołajczyk. *Patol. Pol.* 22(4):653-664, 1971.

Penicillin (100,000 U/day i.m.) or streptomycin (10 mg/day) was administered throughout 24 days following the impregnation of female Wistar rats weighing approximately 200 g. Neither antibiotic caused visible morphologic or developmental changes in the fetuses. Streptomycin diminished the fertility of the rats, with 6 out of 20 becoming pregnant and producing 59 offspring, as compared to 18 out of 27 becoming pregnant and producing 160 offspring following penicillin treatment, and 16 out of 23 becoming pregnant and producing 134 offspring with no treatment. Both antibiotics caused changes in enzymatic activity in the fetal livers. Streptomycin increased the activity of alkaline and acid phosphatase, 5-nucleosidase and ATPase. Penicillin caused a decrease in acid phosphatase and an increase in the other enzymes. It is concluded that streptomycin has a stimulating, and penicillin an inhibiting effect on the catabolic processes in the liver of these fetuses.

10060 THE BIOSYNTHESIS OF CHOLESTA-8,14-DIEN-3β-OL BY CHANG HUMAN LIVER CELLS. (E.)

Wilton, D. C. (U. Southampton Dept. Physiol. Biochem., England). *Biochem. J.* 125(4):1153-1154, 1971.

A number of radioactive sterol intermediates may be isolated from tissue culture of Chang human liver cells when the cells are grown in the presence of [U-^{14}C] acetate. One particular sterol peak, that accounted for about 10% of the total radioactivity in the sterol fraction, has been identified as cholesta-8,14-dien-3β-ol. The identification of the sterol as a major intermediate, biosynthesized by Chang liver cells, emphasizes the importance of the 8,14-dienes in cholesterol biosynthesis. The radioactive peak corresponding to cholesta-8,14-dien-3β-ol was eluted with methanol, mixed with its non-radioactive conterpart, recrystallized 3 times and still retained the radioactivity. The specific radioactivity fell with crystallization with cholesta-7,14-dien-3β-ol, thus indicating that this compound does not crystallize with the 8,14-diene and the unknown sterol is cholesta-8,14-dien-3β-ol. The Chang cells were also noted to remove the 4-methyl group, originally present in lanosterol before reduction of the Δ^{14-15} double bond.

10061 FORMATION OF BILIRUBIN GLUCOSIDE. (E.)

Wong, K. P. (U. Singapore Dept. Biochem). *Biochem. J.* 125(4):929-934, 1971.

Bilirubin glucoside is biosynthesized in vitro by enzymes found in the rat liver microsomal fraction. The enzyme that catalyzes the transglucosylation is similar in many ways to glucuronyltransferase having a similar optimum pH and requirement for Mg^{2+}. Spontaneous dehydrogenation was eliminated by incubation for 60 min prior to specific fluorometric analysis. When the kinetic results of the 2 enzymatic reactions involving glucosyl- and glucuronyl-transferase were compared, a lower Km of glucosyl-transferase suggested this to be the favored route of conjugation in the rat. It is envisaged that glucosylation of bilirubin may be the more probable pathway for conjugation in the rat; however, the role of UDP-glucose as an immediate precursor of glycogen may be a limiting factor. The concentration of a glycone and availability of bilirubin may also be rate-determining factors. When the specific activities were compared, the activity of glucuronyltransferase appeared higher and may be attributable to a lower molar extinction coefficient of the azobilirubin glucoside or incomplete diazotization in the absence of an accelerator.

10062 BLOOD-GAS ANALYTIC STUDIES DURING HOMOLOGOUS LIVER TRANSPLANTATION IN THE PIG.

(Ger.) Boeckl, O. (Country Hosp. Inst. Exp. Surg., Salzburg, Austria), E. Hell, G. Zimmermann, H. Fitzga, P. Jecel and H. J. Gibitz. *Z. Gesamte Exp. Med.* 156(1):67-72, 1971.

Using the micromethod of Astrup, a total of 204 blood gas analyses were carried out in 42 pigs which received orthotopically homologous liver transplantations, with at least 1 analysis before, during and after the anhepatic stage. Acidosis of different severity and etiology developed in 35 experiments. There was a strong correlation between severity of acidosis and survival. In the initial (post-narcotic) stage of liver transplantation acidosis was respiratory in 13 cases and metabolic in 4. In the anhepatic bypass phase acidosis was metabolic in 11 and respiratory in 5, and in the revascularization phase it was metabolic in 18 and respiratory in 10. Serum lactic acid levels increased correspondingly from an initial average base level of 0.82 to 1.57 micromoles/liter during the anhepatic and to 2.74 micromoles/liter during the revascularization range. No significant changes in ammonia levels were detected. Alkalosis developed in 4 pigs; these were respiratory in nature and developed during the anhepatic stage. It is stressed that constant control of blood gas values and buffer therapy during liver transplantation are mandatory for positive results of the operation.

10063 BIOCHEMICAL ADAPTATION IN RAT LIVER IN RESPONSE TO MARGINAL OXYGEN TOXICITY.

(E.) Gorman, R. R. (Colorado State U. Lab. Aerospace Biol., Fort Collins), J. P. Jordan, J. B. Simmons and D. P. Clarkson. *Biochem. J.* 125(2): 439-447, 1971.

The level of hepatic glucose 6-phosphate dehydrogenase (G6PDH) activity was increased in rats exposed to a 5 lb/square inch, 100% oxygen environment. Glyceraldehyde 3-phosphate dehydrogenase, isocitrate dehydrogenase, and succinate dehydrogenase concentrations were not altered. Further evidence for changes in oxidative glucose metabolism was noted by the doubling of the importance of the pentose phosphate pathway and the decreased expiration of radioactive carbon by the hyperoxic animals. Pyruvate dehydrogenase and 2-oxoglutarate dehydrogenase may be inactivated by the marginally hyperoxic state, and evidence indicates that this is the mechanism for oxygen toxicity in the 5 lb/sq. inch, 100% O_2 environment. When tricarboxylic acid cycle intermediates were injected the induction of glucose 6-phosphate dehydrogenase was decreased whereas the injection of 2-oxoglutarate potentiated the increase of glucose 6-phosphate dehydrogenase activity. The hyperoxic animals exhibited a decreased hematocrit when compared to the controls but other parameters of weight gain and food consumed were the same. Coenzyme A concentrations were not decreased until after 14 days of exposure and probably do not involve inactivation of the dehydrogenases.

10064 STUDIES ON FLAVONOID METABOLISM. BILIARY AND URINARY EXCRETION OF METABOLITES OF (+)-[U-^{14}C]CATECHIN.

(E.) Das, N. P. (U. Singapore Fac. Med.) and S. P. Sothy. *Biochem. J.* 125(2):417-423, 1971.

The pattern of biliary and urinary excretion of metabolites of (+)-[U-^{14}C]-catechin after i.v. administration of the flavonoid was studied in 6 rats. Biliary excretion was of great importance in the elimination of the catechin. Comparisons were made between rats having the common bile duct and ureter cannulated, rats with only the ureter cannulated, and rats with ligation of the common bile duct and cannulation of the ureter. Seven metabolites were identified by color reactions and their R_c values. Large amounts of radioactivity (33.6-44.3%) of the 24-hr dose were excreted in the bile as 2 glucuronide conjugates and as 3 other unconjugated metabolites. A maximum excretion in both bile and urine was noted within half to one-and-a-half hr after i.v. administration and suggests probable liver metabolism or transformation. A second peak in radioactivity was noted in the 9-10 hr urine collection in rats in which bile reached the large intestine and was attributed to reabsorption from the large intestine. The findings of 4 additional metabolites in these rats seems due to the action of intestinal micro-organisms. Phenolic acid and lactone metabolites were not detected.

10065 CHANGES OF THE SMOOTH ENDOPLASMIC RETICULUM INDUCED BY RIFAMPICIN IN HUMAN AND GUINEA-PIG HEPATOCYTES.

(E.) Jezequel, A. M. (U. Camerino Ctr. Study Action Drugs Liver, Italy), F. Orlandi and L. T. Tenconi. *Gut* 12(12):984-987, 1971.

The effects of rifampicin on the morphology of hepatocytes were studied in guinea pigs and humans. No structural modification was observed with the light microscope after rifampicin treatment in either species. In guinea pigs, after 2 days of treatment with rifampicin (80 mg/kg) almost all hepatocytes showed an increase in the amount of smooth endoplasmic reticulum in various limited areas of the cytoplasm. The vesicles of the smooth endoplasmic reticulum took a tubular form and were more uniform in size than in untreated animals. These changes became more evident and involved more cells as the duration of treatment was extended, including the presence of dilated cisternae of the rough endoplasmic reticulum and numerous ribosomes and polysomes. In humans, after 2 days of treatment with rifampicin the distribution of the smooth endoplasmic reticulum was modified in many hepatocytes: next to areas of apparently normal smooth endoplasmic reticulum, dense islets were present, due to the concentration of vesicles and tubules of the smooth endoplasmic reticulum. These islets were distributed in the cytoplasm and usually contained some rosettes of glycogen. Thus, although rifampicin induces changes in the smooth endoplasmic reticulum in both human and guinea pig hepatocytes, the pattern of proliferation is different.

10066 SERUM ENZYMES DERIVED FROM LIVER CELL FRACTIONS. I. THE RESPONSE TO CARBON TETRACHLORIDE INTOXICATION IN RATS. (E.) Curtis, S. J., M. Moritz and P. J. Snodgrass (Peter Bent Brigham Hosp., Boston, Mass.). *Gastroenterology* 62(1):84-92, 1972.

Sorbitol dehydrogenase (90%) was found in the supernatant, 70% of ornithine carbamyl transferase was in the mitochondrial-liposomal fraction, 72% of microsomal liver esterase was in the microsomal fraction, arylsulfatase-B was seen in liposomes and nicotinamide mononucleotide adenylyl transferase was in nuclei. After a single intragastric dose of CCl_4, serum sorbitol dehydrogenase activity increased by 3 hr and serum ornithine carbamyl transferase between 6 and 12 hr, times corresponding to known onset of CCl_4 injury to cellular and mitochondrial membranes, resp. Serum lysosomal and nuclear enzymes were normal throughout, while serum microsomal esterase did not increase until 23 hr after onset of CCl_4 injury to the endoplasmic reticulum. Correlations were not apparent between serum activities of the first 3 enzymes and their specific activities in cell fractions or homogenates. The timing or degree of elevation of serum enzymes does not predict the onset or severity of intracellular injury because of the many variables affecting serum enzymes.

10067 SERUM ENZYMES DERIVED FROM LIVER CELL FRACTIONS. II. RESPONSES TO BILE DUCT LIGATION IN RATS. (E.) Moritz, M. and P. J. Snodgrass (Peter Bent Brigham Hosp., Boston, Mass.). *Gastroenterology* 62(1):93-100, 1972.

Acute obstruction of the rat common bile duct caused a rapid rise in serum enzymes derived from the cytoplasm (sorbitol dehydrogenase) and mitochondria (ornithine carbamyl transferase) of the liver cell. From 1-24 hr after duct ligation these 2 enzymes increased in serum to levels as high as those seen after a single dose of CCl_4, although the degree of necrosis was much less in obstruction. From 24 hr-18 days, the activities of these 2 enzymes fell to lower, but still elevated levels. Serum microsomal liver esterase did not change after bile duct ligation, but was elevated 24 hr after CCl_4. Duct ligation had no effect on either serum arylsulfatase B (lysosomal) or nicotinamide mononucleotide adenylyl transferase (nuclear) activities. Correlations between serum and cell fraction activities were not observed.

10068 AN AUTOANTIBODY-LIKE FACTOR REACTIVE WITH LIVER PARENCHYMAL CELLS IN THE SERUM OF THE PIG. (E.) Warr, G. W., A. Lascelles, R. Y. Calne and R. R. A. Coombs (U. Cambridge Dept. Pathol., England). *Clin. Exp. Immunol.* 9(3):339-344, 1971.

Attempts were made to characterize an autoantibody-like factor found in the serum of pigs which was reactive with autologous disaggregated liver cells. The immunoglobulin autoreactive with liver cells was found in the IgM fraction only. The activity of the serum was almost totally destroyed by treating serum with an equal volume of 0.1 M 2-mercaptoethanol at 37°C for 2 hr. The strongest reaction was obtained with the anti-IgM reagent; however, a definite reaction was also obtained with the entirety class-specific anti-Fc μ reagent, while no mixed agglutination was produced with the anti-Fc γ reagent. When guinea pig complement was added to suspensions of liver cells, before and after treatment with autologous heat-inactivated pig serum and a 0.1% suspension of human group O red cells was added, definite immune adherence was shown on the serum-treated liver cells but not by the untreated liver cells. Thus, the autoantibody-like factor seems to be IgM and is capable of fixing complement.

10069 ORTHOTOPIC LIVER TRANSPLANTATION IN THE DOG. (E.) Sivula, A. (Univ. Cent. Hosp., Helsinki), M. Lempinen, K. Salmenkivi and M. Paloheimo. *Acta Chir. Scand.* 137(5):437-444, 1971.

Orthotopic liver transplants were performed in 18 dogs using a modification of Calne's technique for portal bypass and suture of the portal anastomosis. End-to-end arterial anastomosis was accomplished between the common hepatic artery of the donor and the right renal artery of the recipient, and biliary drainage was done by cholecystojejunostomy with Roux-en-Y. Twelve dogs died within 12 hr of operation, 5 from intra-abdominal hemorrhage and 5 from portal thrombosis. There was 1 operative death due to portal congestion. Five dogs survived for 5-78 days after transplantation. For the survivors the mean graft perfusion time was 25 min, recipient's anesthesia time 3 hr 36 min, portal bypass time 34 min, and liver ischemia time 49 min. In these dogs immunosuppressive therapy consisted of azathioprine, hydrocortisone and prednisone, while antibiotic therapy included large doses of ampicillin and chloramphenicol. At necropsy, only 1 of these dogs showed any rejection-induced changes, the others dying of various complications which only indirectly involved rejection.

10070 LOSS OF HAEM IN RAT LIVER CAUSED BY THE PORPHYROGENIC AGENT 2-ALLYL-2-ISOPROPYLACETAMIDE. (E.) De Matteis, F. (Med. Res. Council Toxicol. Unit, Carshalton, Surrey, England). *Biochem. J.* 124(4):767-777, 1971.

The effect of 2-allyl-2-isopropylacetamide on the cytochrome P-450 concentration in rat liver microsomal fractions was studied. When starved rats were given a single s.c. dose of 2-allyl-2-isopropylacetamide there was a rapid decrease in the cytochrome P-450 concentration in the liver microsomal fraction followed from about 10 hr by a gradual increase up to above normal concentration. A concomitant loss of microsomal heme and a brown-green discoloration of the whole liver and particularly of the microsomal fraction was observed. The observed loss of cytochrome P-450 was not produced through a general effect on the endoplasmic reticulum. Pretreatment of rats with phenobarbitone or DDT greatly increased the loss of cytochrome P-450 caused by 2-allyl-2-isopropylacetamide, whereas compound SKF-525A (an inhibitor of drug-metabolizing enzymes) decreased the loss. The intensity of brown-green discoloration of the liver and of the microsomal fraction and the loss of total microsomal heme that accompanied the fall in cytochrome P-450 concentration after the administration of 2-allyl-2-isopropylacetamide appeared to be related to the rate and extent of cytochrome P-450 loss. The observed loss of liver heme may have been due to the stimulation of 5-aminolevulate synthetase activity caused by 2-allyl-2-isopropylacetamide.

10071 ULTRAFILTRATION OF CONJUGATED BILIRUBIN IN THE BILE OF DOGS. (Fr.) Barac, G. (U. Liege Physiopathol. Lab., Belgium). *Arch. Int. Physiol. Biochim.* 79(3):619, 1971.

Spectrophotometric determinations of bilirubin were made on gallbladder bile from dogs before and after ultrafiltration. Depending upon the sample, 45-64% of the conjugated bilirubin passed through the filter.

10072 OBSERVATIONS ON HEPATIC HISTOLOGY AND FUNCTION IN ALCOHOLIC DOGS. (E.) Chey, W. Y. (Genesee Hosp., Rochester, N. Y.), S. Kosay, H. Siplet and S. H. Lorber. *Am. J. Dig. Dis.* 16(9):825-838, 1971.

When six dogs were administered excessive quantities of ethanol daily for periods from 10-18 months, hepatic lesions similar to the lesions of human alcoholic liver disease developed. The animals were fed a balanced diet. The ethanol was delivered through a esophagostomy and venous blood levels after alcohol administration ranged from 315-477 mg%. Biopsy of the liver revealed fatty metamorphosis in 4 of the six dogs. Degenerative change of the hepatocytes, cellular necrosis, polymorphonuclear infiltration, and centrolobular fibrosis was also observed. Liver function abnormalities included elevated serum alkaline phosphatase, SGPT, SGOT, and decreased albumin levels. These changes are comparable to the changes observed in alcoholic hepatitis, or alcoholic liver disease other than cirrhosis. There were no comparable changes in control dogs.

10073 STUDIES ON THE MECHANISM OF FASTING HYPERBILIRUBINEMIA. (E.) Bloomer, J. R., P. V. Barrett, F. L. Rodkey and N. I. Berlin (NCI, Bethesda, Md.). *Gastroenterology* 61(4, Pt. 1):479-487, 1971.

Hyperbilirubinemia and hepatic bilirubin clearance of fasting were investigated in 12 individuals (10 healthy subjects and 2 with constitutional hepatic dysfunction or Gilbert's disease) and male Sprague-Dawley rats. Plasma bilirubin concentration (Br) increased in the 12 subjects by 23 to 334% after fasting from 1 to 3 days. Eighty-six percent of this increase was due to an increase in the unconjugated fraction and occurred mostly during the first 24-34 hr of fasting. The percentage increase in Br did not correlate well with the magnitude of the baseline value. Hepatic clearance of bilirubin from the plasma in 5 subjects using bilirubin-^{3}H was reduced by 28 to 54% during fasting and accounted for the increase in plasma unconjugated bilirubin which was not found to result from an increase in plasma bilirubin turnover. The mean change in Br in 5 subjects was 188% whereas the mean change in the carbon monoxide production rate was only 24%. Disappearance of indocyanine green during baseline and fasting states was not different and indicated that hepatic blood flow was not decreased during fasting. Nine homozygous Gunn rats with unconjugated hyperbilirubinemia showed increased Br of 41% after a 48-hr fast as compared to controls. Bilirubin clearance studies in 2 rats showed 44% decreased whole body bilirubin clearance after fasting and returned to control values with refeeding. During fasting the ratio of the hepatic bilirubin pool to the plasma bilirubin pool also decreased. Reduced hepatic bilirubin clearance during fasting appears primarily responsible for the increase in plasma bilirubin clearance.

10074 SERUM TRANSAMINASES AND SERUM ZINC IN DIET-INDUCED CIRRHOSIS IN THE RAT. OBSERVATIONS ON THEIR CHANGES. (Ger.) Fritsch, H. (Univ. Med. Clin., Heidelberg, Germany), K. Schimpf, J. Lenhard, E. Ritz and V. Urban. *Acta Hepatosplenol. (Stuttg.)* 18(4):286-294, 1971.

A diet containing 40% butter, 5% cholesterol, and 2% cholic acid, administered for 21 weeks, induced cirrhosis in adult male Sprague-Dawley rats. SGOT and SGPT activities had increased by the end of week 2, decreased somewhat during weeks 9-17, and then increased continuously. Serum zinc levels decreased progressively and significantly, even before symptoms of cirrhosis appeared. A characteristic feature of this form of cirrhosis was the appearance of mesenchymal cell nodules in the liver lobule after 2 weeks. Increases in SGOT and SGPT activities are considered to be manifestations of cirrhosis; elevated SGPT activities in particular are regarded as a good indication of damage occurring in the hepatic epithelium. Although the reason for decreased zinc levels is not yet definitely understood, it may be due to a decrease in serum albumin and globulins which serve as vehicles for zinc transport.

10075 PARENCHYMAL LIVER DAMAGE AND PORTAL HYPERTENSION IN GRANULOMATOUS HEPATITIS.

(Ger.) Liehr, H. (Justus Liebig U. Med. Clin., Giessen, Germany), M. Grün, B. Leinweber and H. A. Kühn. *Acta Hepatosplenol. (Stuttg.)* 18(4):320-328, 1971.

Granulomatous hepatitis was induced in rats by introducing a silicon dioxide suspension (particle size 5-10 µ) into the portal system by the intestinal vein. After 70 days the activity of SGPT had increased slightly but no change occurred in the activities of alkaline phosphatase and leucine aminopeptidase. At this time the portal pressure, measured indirectly as intrasplenic pressure, reached a maximum and progressive granulomatosis was most evident, particularly in the area around the central vein where liver cell destruction was observed.

10076 EXPERIMENTAL STUDIES ON THE RELATION BETWEEN LIVER FUNCTION AND PLASMA CHOLINESTERASE ACTIVITY. (Ger.) Boelcke, G. (U. Gottingen Inst. Pharmacol. Toxicol., Germany) and W. Poser. *Z. Gastroenterol.* 9(6):405-412, 1971.

Liver damage induced in rabbits by administration of allyl alcohol (30 mg/kg p.o. through a stomach tube) was manifested by increased SGPT and serum glucose dehydrogenase activities, but no change occurred in total serum protein levels or in acetylcholinesterase activity in the serum, whole blood, or RBC. No acetylcholinesterase or benzoylcholinesterase was synthesized by perfusing isolated guinea-pig livers for 2 hr with a solution containing a high concentration of amino acids (55.4 mg/100 ml). Addition of allyl alcohol (120 mg) to the perfusion medium or the cutting off of the O_2 supply increased succinate dehydrogenase, glucose dehydrogenase, and GOT activities in the perfusion medium but did not induce acetylcholinesterase or benzoylcholinesterase activity. These findings suggest that determinations of plasma cholinesterase activities are of little value in diagnosing parenchymal liver damage.

10077 EFFECTS OF PYLOROPLASTY AND VAGOTOMY ON THE CANINE GALLBLADDER BILE SALTS. (E.) Inberg, M. V. (U. Turku Dept. Surg., Finland), J. Ahonen and T. M. Scheinin. *Acta Chir. Scand.* 137(5):445-449, 1971.

Eleven dogs were studied for the effects of pyloroplasty and truncal vagotomy on the concentrations of taurocholate and taurodeoxycholate in the gallbladder bile. Group I (combined truncal vagotomy and pyloroplasty) and Group II (pyloroplasty, selective gastric vagotomy and truncal vagotomy) showed a small but significant decrease in the concentration of taurocholate after truncal vagotomy and pyloroplasty but a pronounced decrease in the concentration of taurodeoxycholate. Thus, the ratio of taurocholate to taurodeoxycholate was increased in all dogs after truncal vagotomy. In Group II the operations were performed successively and the increase in the taurocholate:taurodeoxycholate ratio was observed after pyloroplasty alone and selective gastric and truncal vagotomy did not cause a further increase. Taurocholate concentration decreased following pyloroplasty and the effect of pyloroplasty was also demonstrated in the Group that received gallbladder cannulation and pyloroplasty separately. Prolonged gallbladder cannulation had no observed effect on the bile salt ratio. These results may indicate a relation between diarrhea following gastric surgery without vagotomy.

10078 INTRASPLENIC THYROID IMPLANTATION WITH REVERSE SPLENOCAVAL SHUNTING: A MORPHOLOGIC AND FUNCTIONAL EVALUATION. (E.) Dardik, H. (Montefiore Hosp., Bronx, N. Y.), I. Dardik, R. B. Smith, S. Mitsudo, A. Sherman and M. L. Gliedman. *Surgery* 70(4):561-568, 1971.

The role of the liver in thyroxine metabolism was studied by comparing groups of dogs in which the entire splenic venous outflow was either left intact or directed away from the liver into the systemic venous circulation. The immunologic response to allogenic thyroid implanted within the spleen was also examined. The PBI values in dogs who underwent thyroid autoimplantation showed a consistent drop following intrasplenic transplantation. All of the animals that underwent autoimplantation and splenocaval shunt demonstrated an immediate rise in PBI which then fell to below preoperative levels between the first and second preoperative week. PBI values again rose between the second and third weeks. Following splenectomy there was a sustained fall in PBI. In dogs that underwent alloimplantation and splenocaval shunting, an early rise in PBI occurred, but after the first week, a rapid and sustained fall occurred. Radioactivity was found over the splenic area in 4 of 6 dogs, but not over the cervical area in any dog. Autogenous thyroid tissue can survive and function after intrasplenic implantation and the hepatic inactivation of thyroid hormones can be eliminated by diversion into the systemic circulation.

10079 BILE SALTS AND LIPOLYSIS. THE INHIBITION OF SPONTANEOUS LIPOLYTIC ACTIVITY AND HORMONE SENSITIVE LIPASE. (E.) Storke, A. (Charles U. Med. Sch., Prague), E. Fabian and J. Fabianova. *Enzyme* 12(3):269-272, 1971.

10080 COMPUTER SIMULATION AND ANALYSIS OF TRYPTOPHAN METABOLISM VIA KYNURENINE PATHWAY IN LIVER. (E.) Heinmets, F. (U.S. Army Natick Lab., Mass.). *Comput. Biol. Med.* 1(4): 323-336, 1971.

10081 VITAMIN B12 CONTENT IN LIVER TISSUE AND IN SERUM FROM VARIOUS ANIMAL SPECIES. (E.) Hippe, E. (Glostrup Hosp., Copenhagen, Denmark). *Comp. Biochem. Physiol.* 40(1B):301-308, 1971.

10082 STUDY OF THE RETICULIN FIBERS AND THE LIVER CELLS DURING HEPATIC REGENERATION IN DIVERSE EXPERIMENTAL CONDITIONS. (Rum.) Preda, V. (Inst. Med. Pharm. Cluj, Rumania) and O. Craciun. *Cluj. Med.* 44(2):363-369, 1971.

10083 THE PLASMA CLEARANCE AND LIVER UPTAKE OF IRON FROM TRANSFERRIN OF LOW AND HIGH IRON SATURATION. (E.) Fletcher, J. (Univ. Coll. Hosp. Med. Sch., London). *Clin. Sci.* 41(5): 395-402, 1971.

10084 DESCRIPTION OF ANOMALOUS E.S.R. SIGNALS FROM NORMAL RABBIT LIVER. (E.) Hutchison, J. M. S. (U. Aberdeen Dept. Med. Physiol., Scotland), M. A. Foster and J. R. Mallard. *Phys. Med. Biol.* 16(4):655-661, 1971.

10085 THE INFLUENCE OF PHYSICAL STRESS BEFORE AND AFTER SWIM TRAINING UPON THE HEPATIC TISSUE AND SERUM ENZYME VALUES OF RATS. (Ger.) Mollmann, H. (U. Munster Med. Sch., Germany), D. Braun, D. Clasing and H. Alfes. *Pfluegers Arch.* 328(4):292-306, 1971.

10086 CHOLESTEROL PRODUCTION IN OBESITY. (E.) Miettinen, T. A. (U. Helsinki 3rd Dept. Med.). *Circulation* 44(5):842-852, 1971.

10087 CRITICAL CYTOPLASMIC MASS AND THE INITIATION OF THE PROLIFERATIVE RESPONSE IN THE RAT LIVER. (E.) Weinbren, K. (Univ. Med. Sch., Nottingham, England), G. A. Stirling and S. L. A. Washington. *Br. J. Exp. Pathol.* 52(5): 583-588, 1971.

10088 BILIARY ELIMINATION OF AFLATOXIN B1 BY THE RAT. (It.) Scoppa, P. (CCR Euratom, Ispra, Italy), E. Marafante and L. Rodichero. *Boll. Soc. Ital. Biol. Sper.* 47(15-16):475-477, 1971.

10089 THE MITOTIC CYCLE OF HEPATOCYTES DIVIDING AT THE BEGINNING AND END OF THE PROLIFERATION PERIOD IN THE REGENERATING LIVER OF MOUSE. (Rus.) Faktor, V. M. (Inst. Developm. Biol., Moscow). *Biull. Eksp. Biol. Med.* 72(9):97-99, 1971.

10090 FEATURES OF POST TOXIC REPARATIVE REGENERATION OF THE LIVER OF RATS WITH INTACT ADRENALS AND WITH CORTICOSTEROID DEFICIENCY. (Rus.) Iakobson, G. S. (Cent. Sci. Res. Lab., Novosibirsk, USSR), O. A. Gromova and S. G. Dobrovolskaia. *Biull. Eksp. Biol. Med.* 72(7): 95-99, 1971.

10091 ISOLATION OF A RETICULOCYTE PROTEIN WHICH SPECIFICALLY INHIBITS THE CELL-FREE SYNTHESIS OF LIVER PROTEINS. (E.) Levy, F. (Inst. Molec. Pathol., Paris), L. Tichonicky and J. Kruh. *Biochimie* 53(5):671-677, 1971.

10092 CONTRIBUTION OF FLOATING FAT TRIGLYCERIDE AND OF LECITHIN TOWARDS FORMATION OF SECRETORY TRIGLYCERIDE IN PERFUSED RAT LIVER. (E.) Bar On, H. (Hadassah U. Hosp., Jerusalem), P. S. Roheim, O. Stein and Y. Stein. *Biochim. Biophys. Acta* 248(1):1-11, 1971.

10093 DISTRIBUTION OF CHYLOMICRON CHOLESTERYL ESTER BETWEEN PARENCHYMAL AND KUPFFER CELLS OF RAT LIVER. (E.) Nilsson, A. (Cornell U., Grad. Sch. Nutr., Ithaca, N. Y.) and D. B. Zilversmit. *Biochim. Biophys. Acta* 248(1): 137-142, 1971.

10094 IDENTIFICATION OF SOME CONSTITUENTS OF RAT BILE BY MEANS OF THIN LAYER CHROMATOGRAPHY. (Pol.) Obojska, K. (Lekow Inst., Warsaw, Poland), Z. Kolodynska, W. Wieniawski and A. Desperak Naciazek. *Acta Pol. Pharm.* 28(3):311-317, 1971.

10095 EXPERIMENTAL LIVER NECROSIS IN HYPOTHERMIA. INVESTIGATIONS WITH CARBON TETRACHLORIDE AND THIOACETAMIDE. (Ger.) Schlicht, I. (Free U. Berlin Med. Clin.). *Z. Gesamte Exp. Med.* 156(3):183-194, 1971.

10096 EFFECT OF THE ADRENAL FUNCTION ON THE LEVEL OF HEPATIC AND EXTRAHEPATIC ARGINASE. (E.) Mimic Oka, J. (Inst. Biochem., Belgrade, Yugoslavia), Z. Cupic and I. Japundzic. *Acta Med. Iugosl.* 25(3):267-272, 1971.

10097 STUDIES ON BILIRUBIN IN AMNIOTIC FLUID WITH SPECIAL REFERENCE TO LIVER FUNCTION TESTS. (E.) Ojala, A. (U. Oulu Dept. Obstet., Finland). *Acta Obstet. Gynecol. Scand.* 50(Suppl. 10):1-72, 1971.

10098 TRANSFER OF INSULIN INTO THE BILE IN THE RABBIT IN LATE PREGNANCY. (E.) Lopez Quijada, C. (Gregorio Maranon Inst., Madrid), P. M. Goni and E. Blazquez. *Acta Diabet. Lat.* 8(3):469-478, 1971.

See also numbers: 9894, 9912, 10136, 10560, 10629

10099 INHIBITION OF RAT SMALL-INTESTINAL α-(1→2)-FUCOSYLTRANSFERASE. (E.) Bella, A., Jr. (VA Hosp., San Francisco, Calif.) and Y. S. Kim. *Biochem. J.* 125(4):1157-1158, 1971.

The structural requirements for the inhibition of an α(1→2) Fucosyltransferase that transfers fucose to acceptors having a terminal B-galactosyl residue (glycoproteins and oligosaccharides) was studied. The product of the reaction (GDP) was a competitive inhibitor. Similar inhibition by GMP, GTP, and GDP-mannose suggested that the guanosine moiety might attach substrate to enzyme. Studies of pig submaxillary gland mucin revealed that the most effective inhibitor of the enzyme was GDP, with GMP and GTP also effective. The presence of a phosphate residue on the C-5' of guanosine seems to be a requirement for good inhibition but the integrity of the ribose moiety was not necessary for inhibition. The inhibition was diminished also by removal of an amino group from C-2 of the purine ring or by substitution with a hydroxyl group in the inosine phosphate and xanthine phosphates. The inhibiting ability of the purine nucleotide phosphates was completely abolished by substitution of the hydroxyl group on C-6 with an amino group. These results indicate that the most effective inhibitor requires a purine nucleotide with a hydroxyl group on C-6, and amino group on C-2, and a covalently linked phosphate on C-5'.

10100 SECRETIN: A LONG PROGRESS NOTE. (E.) Hubel, K. A. (U. Iowa Coll. Med., Iowa City). *Gastroenterology* 62(2):318-341, 1972.

A review of the literature (251 references). In summary the author discusses the effects of physiological levels (1 CU/kg or less, which causes maximal bicarbonate secretion by the human pancreas) of this hormone on various human organ systems. In the esophagus there is a reduction in resting and gastrin-stimulated pressure of the lower esophageal sphincter. The stomach responds with a reduction in rate of emptying; an inhibition of submaximal acid secretion; and secretion of pepsin. At levels higher than 1 CU/kg, there is inhibition of maximal acid secretion. In the pancreas there is an increase in volume and electrolyte output; increase in trypsin output; and an increase in insulin release by hyperglycemia. At levels greater than 1 CU/kg there is a release of insulin by i.v. casein hydrolysate. The hepatic response is an increase in volume and electrolyte output of bile. In doses of greater than 1 CU/kg this hormone augments the contractile response of the gallbladder to cholecystokinin. The intestine responds with a decrease in duodenal motility, and the kidneys showed increased secretion of sodium, water and base. In the lymphatics, there is increased excretion of sodium, base and lymph.

10101 DIURETIC ACTION OF SECRETIN IN DOG. (E.) Barbezat, G. O. (VA, Los Angeles, Calif.), J. I. Isenberg and M. I. Grossman. *Proc. Soc. Exp. Biol. Med.* 139(1):211-215, 1972.

Mongrel dogs were subjected to a continuous i.v. infusion of 150 mM NaCl at a rate of 0.4 ml/kg-min by a peristaltic pump. After the urinary volume flow stabilized (usually after 3-4 hr of infusion) two baseline 30-min urine samples were collected, after which 0.5 µg/kg-min of either pure synthetic porcine secretin or glucagon was added to the saline infusion for a 30-min period. Urine volumes were increased after both secretin and glucagon. Urinary sodium concentration was not affected by either agent while urinary sodium output was increased by both. There was a delayed (2-3 hr) but significant rise in urinary potassium concentration after secretin, while no significant effect was seen after glucagon. Urinary output of potassium increased significantly with both agents; the response was insignificantly greater with secretin than with glucagon.

10102 THE RESPONSE OF THE TOAD INTESTINE TO PROLONGED STARVATION: A MORPHOLOGICAL, FUNCTIONAL AND METABOLIC STUDY. (E.) Pérez-González, M. (Venezuelan Inst. Sci. Res. Ctr. Biophys. Biochem., Caracas) and J. W. L. Robinson. *Eur. J. Clin. Invest.* 2(1):15-22, 1971.

Toads maintained for several months without solid food were emaciated and lethargic; the intestine lost weight at a greater rate than the whole animal. In autophagous toads the percentage of mucosa in the intestinal wall fell from 65.5 to 34.6% during the process of starvation. Histologically there was striking loss in villous architecture; the number of villi in 30 cross sections dropped from 20 to 11. There was also a thinning of the intestinal wall and a reduction in the ramifications of the villi. The epithelial cell mitotic index was lower and the number of vacuoles in the epithelial layer was higher in autophagous toads. Intestinal absorption of 5 mM labeled L-phenylalanine dissolved in sodium-containing and sodium-free buffers was unimpaired. Intestinal slices of autophagous toads have a lower respiration rate but higher glucose consumption than those of normal animals.

10103 SECRETIN INDUCES RENAL BICARBONATE LOSS IN MAN: (Fr.) Oetliker, O. (U. Berne Dept. Pediatr., Switzerland), B. Hadorn, A. Chattas and S. M. Schultz. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):309-316, 1971.

During renal clearance studies, sodium bicarbonate was administered by i.v. infusion to a 3-yr-old girl with glycogen storage disease, a 5-yr-old girl with congenital adrenal hyperplasia, and a 7-yr-old boy with focal glomerulonephrosis. At the end of the bicarbonate titration studies, secretin was added to the infusate for 4 to 6 clearance periods. In all 3 cases plasma bicarbonate ceased to increase after the secretin was added and the urinary excretion rate of bicarbonate was increased significantly, as was the rate of the excreted fraction of filtered sodium. In 2 of 3, a simultaneous decrease of the rate of renal excretion of the hydrogen ion, in the form of titratable acid plus ammonium, was also demonstrated. It was concluded that the decreased resorption of bicarbonate may have resulted from decreased resorption of sodium, leading to decreased hydrogen ion secretion all along the tubule; or that secretin may have inhibited the sodium-hydrogen ion exchange mechanism in the kidney itself.

10104 DEVELOPMENTAL ASPECTS OF URIDINE DIPHOSPHATE GALACTOSE 4-EPIMERASE IN RAT INTESTINE. (E.) Weinstein, A. (Child. Hosp., Philadelphia, Pa.), O. Koldovský and S. Segal. *Biochem. J.* 125(4):935-941, 1971.

The Km values for uridine diphosphate galactose 4-epimerase were the same in the newborn and adult rat (0.17 mM). However, the enzyme had a Vmax value 2-3 times higher in the adult animal as compared to the newborn. In the adult no differences in epimerase activity was noted in the lower portion of the villi and crypts. In the newborn, epimerase activity began to rise at 17 days of age, peaked at 29 days, then plateaued at adult values. A reversal of epimerase activity in the liver as compared to the intestine was noted between adult and newborn rats. Total epimerase activity was 2-5 times higher in the liver of the newborn as compared to total intestinal activity. In the adult, intestine epimerase activity was 3-4 times higher than total liver activity. Cortisone caused a decrease in epimerase activity in rats up to 17 days of age, but had no effect after 17 days.

10105 PROPERTIES OF PHOSPHOFRUCTOKINASE FROM THE MUCOSA OF RAT JEJUNUM AND THEIR RELATION TO THE LACK OF PASTEUR EFFECT. (E.) Tejwani, G. A. (All India Inst. Med. Sci., New Delhi) and A. Ramaiah. *Biochem. J.* 125(2):507-514, 1971.

Phosphofructokinase of jejunal mucosa in the rat is not inhibited by up to 1.6 mM ATP, with 0.2 mM fructose-6-phosphate in the presence of NH^+, Pi, AMP, and ADP, but its activity is almost zero in their absence or in the presence of any one of them. This suggests a synergistic action for these effectors in order to overcome the inhibition of the phosphofructokinase reaction by excess ATP. These effectors also decrease the value of fructose-6-phosphate in a synergistic manner. High concentrations of ATP greatly increased the Km value for fructose-6-phosphate and can be counteracted by the presence of AMP, ADP, Pi and NH_4^+. At low concentrations of ATP the individual effectors decrease the concentration of F6P required for half maximum velocity and when the effectors are present together the velocity is decreased in an additive manner. A saturating concentration of fructose-6-phosphate (5 mM) has the maximum velocity of the reaction increased 3.3-fold by the presence of 0.3 mM-NH_4^+; with 0.5 mM fructose-6-phosphate a 4.5 mM-NH_4^+ concentration is required for maximum effect. The other effectors do not change the reaction velocity. The mucosal phosphofructokinase may be uninhibited by ATP under aerobic conditions and thus the high rate of glycolysis and lack of the Pasteur effect could be explained.

10106 STUDIES ON HUMAN INTESTINAL IMMUNOGLOBULIN A. (E.) Bull, D. M. (Ohio State U. Coll. Med., Columbus), J. Bienenstock and T. B. Tomasi, Jr. *Gastroenterology* 60(3):370-380, 1971.

Immunochemical analysis showed that immunoglobulin A (IgA) in intestinal secretion shared immunologic characteristics previously described for salivary and colostral IgA. Antigenic determinants were present on the intestinal IgA molecule which reacted with antisera specific for secretory piece derived from saliva and colostrum. On the other hand, reactions of identity with colostral and salivary secretory piece were observed in antisera made specific for secretory piece of intestinal IgA. Intestinal fluid IgA was distributed in both the 11S and 7S regions. Following intestinal perfusion with tissue culture media and oxygenated red blood cells, 11S (secretory) and 7S (nonsecretory) IgA were equally distributed in lumen fluid, whereas a high proportion (70-80%) of high-molecular weight 11S IgA was present in the venous return. Immunodiffusion autoradiography demonstrated the incorporation of ^{14}C-labeled amino acids into secretory piece determinants as well as into 7S and 11S IgA, and large amounts of radiopositive nonsecretory IgA entered the venous phase of the perfused organs. The observation that one-third of the IgA content of intestinal secretion was nonsecretory in nature, and was devoid of the antigenic determinants of secretory piece, may be a reflection of the normal loss of plasma proteins, including immunoglobulins, in the intestinal tract or of dissociation of the 11S IgA after its secretion.

10107 EFFECT OF GLUCAGON ON GASTRIC AND DUODENAL SECRETION IN CHICKENS. (E.) Kokas, E. (U. North Carolina Sch. Med., Chapel Hill), S. H. Kaufman and J. C. Long. *Z. Vergl. Physiol.* 74(4):315-325, 1971.

10108 AGE-DEPENDENT MODIFICATIONS OF PROTEIN SYNTHESIS IN SMALL BOWEL RINGS. (Ger.) Hellthaler, G. (Karl Marx U., Dept. Clin. Chem., Leipzig, Germany), H. Kohler and W. Rotzsch. *Z. Alternsforsch.* 24(3):243-247, 1971.

10109 AMINO ACID COMPOSITION OF CECAL CONTENTS AND FECES IN GERMFREE AND CONVENTIONAL RABBITS. (E.) Yoshida, T. (U. Notre Dame Dept. Microbiol., Ind.), J. R. Pleasants, B. S. Reddy and B. S. Wostmann. *J. Nutr.* 101(10):1423-1429, 1971.

10110 EXPERIMENTAL STUDIES ON ALKALINE PHOSPHATASE ACTIVITY IN THE SMALL INTESTINAL MUCOSA AFTER VARIOUS GASTROINTESTINAL OPERATIONS. (Jap.) Sagara, Y. (U. Kagoshima, Sch. Med., Japan). *Acta Med. (Fukuoka)* 41(2):101-120, 1971.

10111 EXPERIMENTAL STUDIES ON LEUCINE AMINOPEPTIDASE AND GLYCYL GLYCINE DIPEPTIDASE ACTIVITY IN THE SMALL INTESTINAL MUCOSA AFTER GASTRIC OPERATIONS. (Jap.) Masuda, Y. (U. Kagoshima Sch. Med., Japan). *Acta Med. (Fukuoka)* 41(2):1-22, 1971.

See also numbers: 9916, 9917, 9918, 9919, 9923, 9928, 9929, 10405

10112 CHANGES IN THE MOUSE INTESTINAL MICROFLORA DURING WEANING: ROLE OF VOLATILE FATTY ACIDS. (E.) Lee, A. (U. New South Wales Dept. Med. Microbiol., Sydney, Australia) and E. Gemmell. *Infect. Immun.* 5(1):1-7, 1972.

The influence of the volatile fatty acids on the ecology of the microflora of the mouse intestinal tract was studied in neonatal mice, germ-free mice and adult specific pathogen-free mice treated orally with penicillin. While no butyric acid was found in the intestine of very young mice, it was present in significant amounts when the animals were 12-14 days old. The concentration rapidly increased to reach a maximum at about 18 days of age; this correlated well with the appearance of fusiform bacteria in high numbers. Significant amounts of acetic acid were present at 7 days, the concentration gradually increasing to a maximum at about day 16. Propionic, isobutyric, isovalenic and valenic acids all appeared at about day 16 in the baby mice, and reached a maximum concentration in a short time. When germ-free mice were placed in an specific pathogen-free rodent colony, the gastrointestinal tract was colonized with bacteria in a similar fashion to that of newborn mice; i.e. coliform bacteria established in very high numbers initially but then declined as strictly anaerobic bacteria appeared in the intestinal content. In these animals, the appearance of significant quantities of acetic and butyric acids coincided with the decline in coliform numbers. Oral administration of penicillin to mice eliminated the normal anaerobic flora and was followed by an increase in the number of coliform bacteria. In these animals, only acetic acid was present in concentrations comparable to the control. The data suggest that the fusiform bacilli are responsible for the presence of the volatile acids which exert an inhibitory effect on the coliform bacteria.

10113 ^{14}C-LABELED AMINO ACIDS IN THE STUDY OF ENDOGENOUS NITROGEN IN THE DIGESTIVE TRACTS OF HOLOXENIC AND AXENIC RATS. (Fr.) Combe, E. (INRA Metabol, Lab., Saint-Genes-Champanelle, France). *C. R. Soc. Biol. (Paris)* 165(2):289-295, 1971.

Five-and-one-half hr after i.p. injection of a mixture of ^{14}C-labeled lysine and glutamic acid, radioactivity had peaked in the contents of both the small intestine and the cecum, in both holoxenic and axenic rats. In holoxenic rats, the percentage of such radioactivity which was contained in the alcohol-insoluble fraction of each was more than 75% and 60%, resp. In axenic rats, 80-90% of the total activity present in intestinal content was found in the alcohol-soluble fraction, with lysine (the only free amino acid present) accounting for 30% of the total and the remainder consisting of glutamic acid and peptides. Radioactivity associated with glutamic acid decreased from 36% of the total, at 3.5 hr after injection, to 13% at 16 hr; that associated with lysine increased proportionally, over the same period of time, while the percentage of demonstrable radioactivity which was contained in the insoluble fraction, in the cecum, increased from 10-20% to 60%, with the increase consisting primarily of lysine (60%) and aminated sugars. It is concluded that the marked compounds found in the insoluble fraction of intestinal content were products of protein synthesis at the level of intestinal and pancreatic tissue; that those found in the soluble fraction were primarily products of digestion; and that resorption and transit through the intestinal wall were significantly slowed in axenic rats. It is also concluded that lysine appeared to be able to pass directly through the intestinal wall.

10114 THE EFFECTS OF EXCESSIVE BACTERIAL PROLIFERATION ON PROTEIN METABOLISM IN RATS WITH SELF-FILLING JEJUNAL SACS. (E.) Miller, B. (Roy. Postgrad. Med. Sch., London), R. Mitchison, S. Tabaqchali and G. Neale. *Eur. J. Clin. Invest.* 2(1):23-31, 1971.

Rats with surgically created self-filling sacs of jejunum increased weight more slowly than controls and reached a maximum weight of 200 g (control 370 g). Blind loop animals ingested 9% less food but excreted twice as much fat as controls. These animals excreted 120% more indican, 30% more indoyl-3-acetic acid, 10% more amines, 66% more hippuric acid and 130% more total phenols; increased urinary excretion of these bacterial degradation products was significant for indican and hippuric acid. Mean bacterial concentrations were 100 times greater throughout the small intestine, due principally to an increased number of anaerobic organisms. This was associated with deconjugation and dehydroxylation of bile acids. Lincomycin was more effective than neomycin in controlling steatorrhea, and in preventing the deconjugation and dehydroxylation of bile acids. Both antibiotics were equally effective in reducing the excretion of bacterial metabolites in the urine of blind loop animals.

10115 ON THE AFFINITY OF 3 DIFFERENT STRAINS OF BACTERIA, INDIGENOUS IN INFANTS' INTESTINES, TO THE MUCOSAL EPITHELIAL CELLS OF THE SMALL INTESTINES OF WHITE RAT FETUSES. (E.) Homma, N. (Tokyo Metropol. Police Hosp., Japan), K. Isoda and T. Asaka. *Paediatr. Univ. Tokyo* (18):45-56, 1970.

Cells of the mucosal epithelial second layer of the small intestines of white rat fetuses were obtained and singly cultivated in the hanging drop position (with hourly changes of medium) and in the standard position (with no change of medium) and were challenged with 3 different indigenous intestinal bacteria (Bif. bifidum G9-1, group IV; L. acidophilus KS 13; S. faecalis 129 B10 3B). Affinity of the bacteria for the epithelial cells was greatest with Bif. bifidum, least with L. acidophilus. L. acidophilus grew aggresively on the cells, while S. faecalis was somewhat aggressive. Within 6 hours, Bif. bifidum seemed to stimulate some metabolism of the epithelial cells. The criteria used to assess affinity of bacteria for epithelial cells consisted of: adhesion to the cells; proliferation on the surface of the cells; activation of metabolism of the cells; non-invasion into the cells; non-aggression on the cells within 10 hr.

10116 EFFECTS OF PROTEIN DEPLETION ON STRENGTH OF COLONIC ANASTOMOSES. (E.) Daly, J. M. (U. Pennsylvania Sch. Med., Philadelphia), H. M. Vars and S. J. Dudrick. *Surg. Gynecol. Obstet.* 134(1):15-21, 1972.

All protein-deprived rats lost weight throughout the study period, whereas controls fed complete diets gained weight and thrived. Bursting strengths of the anastomotic segments decreased as the time interval of preoperative protein deprivation lengthened. Rats deprived of protein for only 1 week preoperatively showed a mean reduction of 17%. Rats depleted of protein for 6 weeks lost 26% of mean body weight, had a 26% mean reduction in colonic anastomosis bursting strength and a 50% lower mean total circulating serum albumin. The mean bursting strength of the anastomosis of a normal control 1 week after operation was 25 mm Hg greater than the mean bursting strength of the unoperated colon in protein-depleted rats. Histologic examination showed no evidence of edema, an indication that the impaired anastomotic healing in protein-depleted rats was not secondary to anastomotic edema but to other effects of protein depletion.

10117 BONE CHANGES IN DOGS, FOLLOWING SUBTOTAL GASTRECTOMY AND VARIOUS RESECTIONS OF THE SMALL INTESTINE. (Ger.) Kuhlencordt, F. (Univ. 1st Med. Clin., Hamburg, Germany) and J. Jowsey. *Z. Gesamte Exp. Med.* 156(2):87-103, 1971.

Irrespective of the type of operation, quantitative microradiographic studies of the skeletal bones of adult dogs showed increased resorption after subtotal gastrectomy, jejunectomy, ilectomy, or resection of the small intestine. Pups who underwent similar surgery showed an inconsistent pattern in this respect. Both adults and pups showed significantly decreased serum phosphorus levels throughout a 6-month postoperative observation period. All ilectomized and jejunectomized animals showed an accompanying decrease of serum calcium levels; all gastrectomized animals, a transient, postoperative increase of serum alkaline phosphatase. The phenomena were attributed to induction of secondary hyperparathyroidism, which varied in degree from one animal to another.

10118 THE ARTERIAL SUPPLY AND VENOUS DRAINAGE OF THE GALLBLADDER. A STUDY OF ONE HUNDRED AUTOPSIES. (E.) Halvorsen, J. F. (Gade Inst., Bergen, Norway) and A. O. Myking. *Acta Chir. Scand.* 137(7):659-664, 1971.

Arteries and veins in the gallbladder were visualized by injection of India ink into the cystic artery. All cases, including those with disease of the liver, gallbladder and ducts were included unless the pathologic process interfered with an exact dissection. On inspection, the subserous arterial ramifications and gallbladder veins and the liver parenchyma around the gallbladder bed, often in an asymmetrical manner, were filled with ink. India ink was found in branches of the hepatic and portal veins associated with the parenchyma under the gallbladder bed. The cystic artery arose from the right branch of the hepatic artery in 79% of the cases; from the common hepatic artery in 10% of the cases; from the left branch of the hepatic artery in 1%; from the point of division of the hepatic artery in 1%; from the gastroduodenal artery in 3%; from the short branch of the right hepatic in 1%; and it arose as 2 separate cystic arteries from the right branch of the hepatic artery in 3%. The main pattern of venous drainage had smaller veins coverging into 2 or 3 larger veins on the side of the gallbladder and commonly at the fundus. A double venous drainage, of varying pattern, was noted in 6 cases. The usually described location of the cystic vein was present in only 5 cases. Venous blood normally drained to the intrahepatic branches of the portal vein.

10119 THRESHOLD DOSES OF 2-DEOXY-D-GLUCOSE FOR HYPERGLYCEMIA AND FEEDING IN RATS AND MONKEYS. (E.) Smith, G. P. (New York Hosp.-Cornell Med. Ctr., White Plains), J. Gibbs, A. J. Strohmayer and P. E. Stokes. *Am. J. Physiol.* 222(1):77-81, 1972.

Food intake and plasma glucose levels were measured after injection i.p. of 2-deoxy-D-glucose in male albino Sprague-Dawley rats and male rhesus monkeys (i.v. infusion). Glucose analogue dose of greater than 100 mg/kg (the threshold dose for hyperglycemia) produced a significant increase in plasma glucose in intact rats at 30 and 60 min after i.p. injection; this increase was dose-dependent over the range of 100-400 mg/kg. The response to 100 mg/kg at both 30 and 60 min was abolished by prior adrenalectomy. There was no reliable increase in food intake by rats at these doses, although at 800 mg/kg rats ate more over a 5-hr period. In monkeys deprived of food for 2 hr, the threshold dose for hyperglycemia after i.v. 2-deoxy-D-glucose was 80 mg/kg; the response was dose-related at 80-100 mg/kg. The threshold dose for feeding was 320 mg/kg; the response was not reliable at 80 mg/kg and it was not dose-related. In both animals the threshold dose of 2-deoxy-D-glucose that elicited hyperglycemia is less than 25% of the threshold dose that elicited increased food intake.

10120 THE ENTEROHEPATIC CIRCULATION. (E.) Dowling, R. H. (Roy. Postgrad. Med. Sch., London). *Gastroenterology* 62(1):122-140, 1972.

The normal physiology of the enterohepatic circulation of bile salts both in experimental animals and in man is reviewed. The applied physiology of an interrupted enterohepatic circulation is discussed in detail since the altered bile salt metabolism of patients with ileal dysfunction may play a major role in the pathogenesis of diarrhea, renal calculi, and gallstone formation, from which ileectomy patients may suffer. The role played by bile salts in regulating synthesis and secretion of biliary cholesterol and phospholipids is mentioned. The liver role in conjugating free bile salts delivered to it and secreting bile salts into the bile by an active mechanism is reported.

10121 SALIVARY ELECTROLYTE CHANGES DURING PREGNANCY. I. NORMAL PREGNANCY. (E.) Marder, M. Z. (Columbia U. Sch. Dent. Oral Surg., New York, N. Y.), S. Worman and I. D. Mandel. *Am. J. Obstet. Gynecol.* 112(2):233-236, 1972.

Antepartum submaxillary calcium concentrations were lower than the concentrations 6 weeks postpartum; parotid calcium concentrations were unchanged throughout pregnancy. No significant changes in flow rate or phosphate concentration were observed for either gland in any sampling period. In both submaxillary and parotid, sodium concentrations were lower during the 3 trimesters of pregnancy than at 6 weeks postpartum. Potassium concentrations in submaxillary and parotid secretions were higher during pregnancy than at 6 weeks but not 1-6 days postpartum. Variations in salivary electrolyte response to the endocrine changes in pregnancy suggest that these secretions may be potentially useful in evaluating endocrine changes.

10122 ALKALINE PHOSPHATASE AND DISACCHARIDASE ACTIVITIES IN THE RAT INTESTINE FROM BIRTH TO WEANING. I. EFFECT OF DIET ON ENZYME DEVELOPMENT. (E.) Goldstein, R. (Shaare Zedek Gen. Hosp., Jerusalem), T. Klein, S. Freier and J. Menczel. *Am. J. Clin. Nutr.* 24(10):1224-1231, 1971.

The factors controlling alkaline phosphatase and disaccharidase activities along the intestine during the suckling and weaning periods and the correlation of these enzymes to food intake was examined in Sabra strain rats. Group 1, suckled normally and weaned on Purina Chow at the normal time of weaning (21st to 22nd day of life), showed highest alkaline phosphatase levels in the ileum for the suckling rats and in the duodenum for weaning rats. Lactase activity and distribution reached adult levels after 18 or 19 days and was higher in the ileum than duodenum or jejunum during the suckling period. Maltase and sucrase activities were lower in adults and when lactase activity decreased as weaning approached, maltase and sucrase began to increase, being higher in the duodenum and jejunum, resp. Group 2a rats were fed a lactose-free diet from the eighth day of life. Most animals died and no existing enzyme changes or appearance of sucrase activity was observed after 72 hr. In Group 2b the lactose-free diet was given from the fifteenth day of life and the animals adapted well, exhibited the enzymatic changes associated with weaning 2 days sooner and demonstrated a correlation between increased alkaline phosphatase in the duodenum and increased sucrase activity. Group 3 weaned on goat's milk from the seventeenth day for 5 days and no effect on the decreased enzymatic activity in the ileum including lactase was observed. Young adult rats (Group 4), given goat's milk for 5 days, showed increased duodenal alkaline phosphatase and sucrase and jejunal lactase and sucrase activities. By the fifteenth day of life both diet and hormones appear involved in the enzymatic activities of the rat intestine.

10123 HEMOLYTIC ANEMIA AND PANCREATIC ACINAR ATROPHY AND FIBROSIS CONDITIONED BY "ELEMENTAL" LIQUID DIETS AND THE ORDINARY INTESTINAL MICROFLORA. (E.) Levenson, S. M. (Yeshiva U. Albert Einstein Coll. Med., Bronx, N. Y.), D. Kan, C. Gruber, L. Crowley, E. R. Jaffee, K. Nakao, E. F. Geever and E. Seifter. *Ann. Surg.* 174(3):469-510, 1971.

Germ-free and conventional rats were fed so-called "elemental" or "space" liquid diets to investigate the effect of the normal flora on mammalian metabolism and nutrition. Conventional animals of several strains were noted to develop a rapidly progressive hemolytic anemia. This anemia responded to the feeding of a solid supplement of ultra-refined protein and would seem to indicate a role for dietary peptides. Pancreatic acinar atrophy and fibrosis and the development of unusual focal metaplasia were also noted. Pancreatic lesions were dependent on the feeding of certain amino acids in liquid form and the presence of certain microbial flora. These lesions may be due to factors that interfere with the processing of an amino acid or to a toxic effect not directly related to the metabolism of the essential amino acid. Factor G activity (Schwarz's growing factor) was present in the casein hydrolysate and not present in the amino acid supplement. The solubilized chemical nature of these "elemental" diets needs to be defined and the role of specific endogenous microflora explored.

10124 ON THE ROLE OF NOREPINEPHRINE IN THE ANORECTIC EFFECT OF D-AMPHETAMINE IN MICE. (E.) Abdallah, A. H. (Dow Chem. Co., Zionsville, Ind.). *Arch. Int. Pharmacodyn. Ther.* 192(1):72-77, 1971.

alpha-Methyltyrosine (64 mg/kg) reduced food intake to values less than control during 2- and 6-hr intervals. D-Amphetamine (4.6 mg/kg) exerted a pronounced anorectic effect and the combined effect of α-methyltyrosine and d-amphetamine reduced food intake significantly less than all groups during 2- and 6-hr intervals, demonstrating an additive rather than antagonistic effect. No anorectic effect was found when α-methyltyrosine was reduced to 32 mg/kg and pretreatment with this dose of α-methyltyrosine neither enhanced nor antagonized the anorectic effect of d-amphetamine. At 16 mg/kg α-methyltyrosine showed no anorectic activity but did antagonize the anorectic effect of d-amphetamine. d-Amphetamine exhibited significant anorectic activity, but failed to do so when combined with α-methyltyrosine, α-Methylmetatyrosine (64 mg/kg) increased food intake above control levels and despite its hyperphagic effect if failed to antagonize the anorectic effect of d-amphetamine. d-Amphetamine alone or when combined with α-methylmetatyrosine, reduced food intake as compared to controls; however, there was no difference in anorexia caused by d-amphetamine administered alone or in combination with α-methylmetatyrosine. The monoamine oxidase inhibitor pargyline (32 mg/kg) elicited no anorectic activity and pretreatment with pargyline did not potentiate the anorectic activity of d-amphetamine during 2- and 6-hr intervals. The anti-amphetamine effects of α-methyltyrosine do not seem related to the degree of norepinephrine depletion and pargyline appears to have no effect on the uptake of norepinephrine in the central nervous system.

10125 ANAEROBIC BACTERIA ON THE MUCOSAL EPITHELIUM OF THE MURINE LARGE BOWEL. (E.) Savage, D. C. (U. Texas Dept. Microbiol., Austin), J. S. McAllister and C. P. Davis. *Infect. Immun.* 4(4):492-502, 1971.

Over 10^{11} oxygen-intolerant anaerobic bacteria per g of fresh tissue were estimated to reside in the ceca and colons in adult mice from 4 different colonies (H/ICR, CF-1, CD-1, Swiss) widely spaced in the U.S. Most of these microorganisms were fusiform-shaped bacteria of at least 3 genera: Fusobacterium, Eubacterium and Clostridium. One or more of these tapered rod-shaped microorganisms can be seen in layers on the epithelium in frozen-section histological preparations of mouse colon. Spiral-shaped microorganisms can also be found near the mucosal epithelia in ultrathin sections of colon and in negatively stained preparations of washings of the colonic mucosal epithelia examined with electron microscopy. Mice from 3 of the 4 colonies showed at least 3 types of spiral-shaped organisms, including both spiral-shaped bacteria and spirochetes. Population levels for these organisms reached values of 10^9 organisms per g of cecum or colon. One anaerobic spiral bacterium isolated in pure culture, was found by immunofluorescence to be intermingled with the fusiform-shaped bacteria in the mucin on the mucosal epithelium in the mouse large intestine.

10126 STUDIES ON THE EPITHELIAL CELLS ISOLATED FROM GUINEA PIG SMALL INTESTINE. (E.) Evans, E. M. (U. Birmingham Dept. Biochem., England), J. M. Wrigglesworth, K. Burdett and W. F. R. Pover. *J. Cell Biol.* 51(2):452-464, 1971.

The metabolism of the intestinal epithelium was studied using sheets of mucosal epithelial cells isolated from guinea pig small intestine after incubation with EDTA. When the sheets were disrupted the cells retained their normal morphology for up to 4 hr, but when the sheets were left intact they retained their shape for 24 hr at room temperature. Respiration which was constant for up to 4 hr was unaffected by the addition of calcium or bicarbonate to the culture medium or by changes in the oxygen tension or pH. Cyanide and iodoacetate inhibited respiration and changes in the extracellular Na^+:K^+ ratio caused some variation. The activity of invertase in the cell suspensions was sufficient to produce many times more glucose from the only available exogenous substrate, sucrose, than would be required to support the observed rates of respiration. Most of the LDH leaving the cells did so in the first 2 hr; after 5 hr about 80% of the total initial activity was still retained. The rate of enzyme leakage increased if cells were continually shaken, when cells were incubated at 37°C or when they were gassed continually with O_2:CO_2 (95%:5%). The rate of leakage into the extracellular fluid was minimal when the Na^+:K^+ ratio was 8:1.

10127 ATYPICAL COLLATERAL SUPPLY IN OCCLUSION OF THE CELIAC TRUNK. (Ger.) Linzbach, C. (U. Bonn Radiol. Clin., Germany), L. Beltz and H. Hunerbein. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 114(6):849-852, 1971.

10128 MECHANISM OF ABSORPTION OF ULTRASOUND IN LIVER TISSUE. (E.) Pauly, H. (U. Pennsylvania Moore Sch. Electr. Engin., Philadelphia) and H. P. Schwan. *J. Acoust. Soc. Am.* 50(2, Pt. 2):692-699, 1971.

10129 REGULATION OF CHOLESTEROL METABOLISM IN MAN. (Nor.) Nicolaysen, R. (Johan Throne Holsts Inst., Oslo, Norway). *Nord. Med.* 86(29):865-872, 1971.

10130 EFFECTS OF DIETARY CHOLESTEROL ON THE REGULATION OF TOTAL BODY CHOLESTEROL IN MAN. (E.) Quintao, E. (Rockefeller U., New York, N. Y.), S. M. Grundy and E. H. Ahrens, Jr. *J. Lipid. Res.* 12(2):233-247, 1971.

10131 STUDIES ON NATURAL GASTRIC FLORA: SURVIVAL OF BACTERIA IN FASTING HUMAN SUBJECTS. (E.) Franklin, M. A. (McGill U., Montreal, Quebec, Canada) and S. C. Skoryna. *Can. Med. Assoc. J.* 105(4):380-386, 1971.

10132 GAS IN THE GASTROINTESTINAL TRACT. (Ger.) Leodolter, I. (Sophien Hosp., Vienna). *Wien. Klin. Wochenschr.* 83(38):670-677, 1971.

See also number: 10815

10133 A COMBINED THIN LAYER-GAS CHROMATOGRAPHIC METHOD FOR THE ANALYSIS OF FATTY-ACID-CONTAINING STOOL FRACTIONS. (E.) Matthys, F. (State U. Ghent Lab. Gerontol. Diet. Nutr. Res., Belgium), A. Christophe and G. Verdonk. *Clin. Chim. Acta* 36(2):341-350, 1972.

The method described enables quantitative determination of the fatty acid pattern in feces of the total lipids, triglycerides, partial glycerides, sterol esters and non-esterified fatty acids. No distinction can be made between the non-esterified fatty acids present in feces as acid, as soluble salt (Na and K soaps) and as almost insoluble salt (Ca and Mg soaps). After extraction, fecal lipids are separated in various fractions by thin-layer chromatography. The fatty acids in each fraction are converted into methyl esters which are analyzed by gas chromatography. Using an internal standard mixture allows the quantitative determination of the major lipid classes.

10134 CANNULATION OF PAPILLA OF VATER VIA FIBER-DUODENOSCOPE. ASSESSMENT OF RETROGRADE CHOLANGIOPANCREATOGRAPHY IN 60 PATIENTS. (E.) Cotton, P. B. (St. Thomas's Hosp., London), L. H. Blumgart, G. T. Davies, J. W. Pierce, P. R. Salmon, R. J. Burwood, B. W. Lawrie and A. E. Read. *Lancet* 1(7741):53-58, 1972.

Subjects consisted of patients with persistent jaundice of enigmatic etiology (30), recurrent biliary tract problems (17) or suspected pancreatic disease (13), all of whom underwent endoscopy with the Olympus JFB fiber-duodenoscope. After passage into the duodenal bulb and aspiration of duodenal juice a silicone preparation was instilled to eliminate frothing, and duodenal peristalsis was suppressed with i.v. hyoscine-N-butyl bromide. The scope was advanced to the superior duodenal angle and rotated through 90-180° to bring the descending duodenum into view. The papilla of Vater was cannulated by maneuvering the scope tip to give a face-on view of the papilla, which was about 2 cm distant. The polyethylene cannula was flushed clear of air and passed through the scope and contrast medium injected under fluoroscopic control. The descending duodenum was reached in all cases; the papilla of Vater was seen in 54 (90%) and cannulated in 44 (73%). The papilla was not seen in 4 with persistent jaundice; useful information was obtained in 1 of these and in 3 of 6 in whom the papilla was seen but not cannulated. Commonest findings were neoplastic distortion and/or strictures and gallstones. Cannulation was successful in 12 of 17 with recurrent biliary tract symptoms. Pancreatograms were achieved in 11 of 13 with suspected pancreatic disease and 7 of these were normal, including that of a patient whose barium meal suggested pancreatic carcinoma. Various anatomical abnormalities in all 3 groups are described.

10135 THE VALUE OF ARTERIOGRAPHY IN THE STUDY OF GASTROINTESTINAL PATHOLOGY. (BASED ON 40 CASES). (Fr.) Cosentino, C. (Antiquaille Hosp., Lyon, France), J.-L. Bertrand and R. Brette. *J. Med. Lyon* 52(1214):1197-1214, 1971.

A discussion concludes that arteriography can be of value in the localization and differential diagnosis of gastrointestinal lesions whose nature or site is uncertain in determining the vascular symptomatology of a lesion whose nature and site are already known, and in demonstrating the existence of lesions which cannot be confirmed by other methods. When splenoportography is contra-indicated or has been unsuccessful, arterioportography is recommended as an alternate technique. Angiography is recommended in the search for metastases (particularly, hepatic metastases), and as a pre-operative measure to determine the extent of a known neoplasm. Note is made that angiographic studies should involve the venous, as well as the arterial, supply.

10136 DETERMINATION OF GLYCOGEN, LIPIDS AND PROTEINS IN HEPATIC NEEDLE BIOPSY. (E.) Brixová, E. (Comenius U. Sch. Med., Bratislava, Czechoslovakia) and V. Dzúriková. *Clin. Chim. Acta* 36(2):543-548, 1972.

Methods are described for glycogen, esterified fatty acids, lipid phosphorus triglycerides, total protein and non-collagen nitrogen determination in a single sample of human liver biopsy. Human liver biopsy specimens weighing 20-25 mg may be obtained by the Menghini or Vim Silverman needle. The cylinder is divided and parts rapidly weighed: 2 mg for glycogen, 5-10 mg for esterified fatty acids, lipid phosphorus and total protein determination, 5 mg for triglycerides and 1-1.5 mg for non-collagen nitrogen determinations. The rest of the tissue can be used for histologic examination.

10137 HYDROLYSIS OF A WATER-INSOLUBLE SUBSTRATE INCORPORATED INTO SOLIDFIED MEDIUM BY THE ENZYME α-AMYLASE CONTAINED IN NORMAL HUMAN BLOOD, SERUM AND PLASMA. (E.) Ceska, M. (Pharmacia AB, Uppsala, Sweden). *Clin. Chim. Acta* 36(2):453-461, 1972.

Water-soluble synthetic blue starch polymer incorporated into solidified agar medium was hydrolyzed by enzyme α-amylase present in human blood, serum and plasma. Where hydrolysis occurred, a transparent circular area formed, the diameter of which was related to α-amylase activity. The size of the transparent circular area increased with increasing time of incubation and temperature, and the diameter of the area decreased with increasing dilution of blood, serum and plasma, the latter dependence holding for long incubation times. Using the same volume of sample, α-amylase activity of fresh blood was lower than that of plasma or serum. This technique is the only one known which presents the measurements of α-amylase activity in whole blood.

10138 A COMPARISON OF CLINICAL MEASUREMENTS OF GASTROESOPHAGEAL REFLUX. (E.) Benz, L. J. (Johns Hopkins Hosp., Baltimore, Md.), L. A. Hootkin, S. Margulies, M. W. Donner, R. T. Cauthorne and T. R. Hendrix. *Gastroenterology* 62(1):1-5, 1972.

Studies were performed on subjects with (29) and without (21) symptoms of gastroesophageal reflux. All 29 symptomatic subjects had a positive acid perfusion test; 26 were shown by pH probe to reflux acid into the esophagus and 15 of these had free reflux. An abnormally low (less than 9.5 mm Hg) resting lower esophageal sphincter pressure was noted in 24. A positive acid barium swallow was found in 19, an indeterminate result in 6. A negative acid perfusion test was seen in 18 of the 21 symptomatic patients. Only 1 had demonstrable reflux of acid and in only 4 was the resting lower esophageal sphincter pressure abnormally low. The acid barium swallow was negative in 8 and indeterminate in 5. The correlation of acid perfusion, acid reflux, sphincter pressure and acid barium swallow and determinate studies (patients with normal neutral barium swallow) in symptomatic patients were 100%, 90%, 83%, 60% and 83%, resp, while in asymptomatic patients they were 86%, 95%, 81%, 38% and 50%, resp. The mean sphincter length did not differ between symptomatic (2.8 cm) and asymptomatic (3.1 cm) patients. Of 27 patients (26 symptomatic) with evidence of reflux by pH probe, 16 (13 symptomatic) had reflux by radiographic examination; X-ray reflux was seen in 3 of 23 who did not show reflux by pH probe.

10139 THE ESOPHAGOGRAM IN THE USUAL ROENTGENOGRAPHIC PICTURE OF THE CHEST. (Ger.) Gurdan, H. (U. Erlangen-Nuremberg Polyclin., Germany) and J. Schmidt. *Internist. Prax.* 11(2): 217-224, 1971.

10140 MENGHINI'S TECHNIQUE OF PERCUTANEOUS LIVER BIOPSY. (Ger.) Lindner, H. (DRK Hosp., Hamburg, Germany). *Dtsch. Med. Wochenschr.* 96(45):1766-1770, 1971.

10141 DIAGNOSTIC VALUE OF INVESTIGATION OF PROTEINS OF THE MUCOSA TUMORS AND GASTRIC JUICE IN PATIENTS WITH CANCER OF THE STOMACH. (Rus.) Kalinovskii, V. P. (N.N. Petrov Res. Inst. Oncol., Leningrad, USSR), N. M. Smirnov and V. F. Sukharev. *Vopr. Onkol.* 17(5):30-39, 1971.

10142 TEN YEARS OF PERORAL BIOPSY OF THE SMALL INTESTINE IN OUTPATIENTS. (Ger.) Ammann, R. (Univ. Med. Polyclin., Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 101(27):1004-1008, 1971.

10143 DETERMINATION OF THE SERUM TRANSAMINASES IN EXPERIMENTAL INFARCTS OF THE INTESTINE. (Sp.) Perez Roura, N. E. (Natl. U. Sch. Med. Sci., Cordoba, Argentina), J. R. Salazar and C. B. Villalba. *Rev. Asoc. Bioquim. Argent.* 36(192-193):26-28, 1971.

10144 THE OBSERVATIONS ON THE SIMULTANEOUS USE OF JIRGL'S TEST AND IRON CITRATE REACTION IN DIFFERENTIAL DIAGNOSIS OF JAUNDICE. (It.) Biagi, M. (United Hosp., Naples, Italy), D. Lampasi and L. Saldutti. *Rass. Int. Clin. Ter.* 51(14):875-892, 1971.

10145 AN IMPROVED RIGID CHOLEDOCHOSCOPE. (E.) Shore, J. M. (Cedars of Lebanon Hosp., Los Angeles, Calif.), L. Morgenstern and G. Berci. *Am. J. Surg.* 122(4):567-568, 1971.

10146 BARIUM ENEMA EXAMINATION USING AN ELECTRONIC TECHNIQUE. A PRELIMINARY REPORT. (E.) Clark, K. (Roy. Infirm., Glasgow, Scotland). *Br. J. Radiol.* 44(528):970-972, 1971.

10147 ANGIOGRAPHIC PICTURES IN STENOSES OF THE ARTERIES OF THE DIGESTIVE TRACT. (Fr.) Tongio, J. (Civil Hosp., Strasbourg, France), P. Beeckman, R. Kieny and P. Warter. *J. Belge Radiol.* 54(5):639-649, 1971.

10148 GASTROCAMERA EXAMINATION OF THE PYLORUS AND PREPYLORIC AREA. (Jap.) Kuramata, H. (Seijin Byo Ctr., Kanagawa, Japan), F. Unayama and S. Eto. *Stomach Intest. (Tokyo)* 6(8):1015-1025, 1971.

10149 INVESTIGATION OF THE SERUM LEVEL OF GUANIDINE ACETATE METHYLTRANSFERASE IN VARIOUS DISEASES OF THE HEPATOBILIARY PANCREATIC SYSTEM. (Rus.) Karelin, A. A., E. P. Guseva and S. R. Mardashev. *Sov. Med.* 34(5):18-23, 1971.

10150 THE ANGIOGRAPHIC PICTURE OF THE INFLAMMATORY OMENTAL TUMOR AND OTHER PROCESSES INVOLVING THE OMENTUM. (Ger.) Benko, G. (Univ. Radiol., Clin., Pecs, Hungary). *Roentgenblatter* 24(6):289-292, 1971.

10151 IDENTIFYING THE CAUSE OF GASTROINTESTINAL BLEEDING. (E.) Anonymous. *Lancet* 2(7721):415-416, 1971.

10152 MANOMETRIC CHOLANGIOGRAPHY: EXPERIENCE IN 90 PATIENTS. (E.) Hopton, D. and T. T. White. *Northwest Med.* 70(10):692-694, 1971.

10153 PERITONEOSCOPY, (WITH SPECIAL REFERENCE TO CIRRHOSIS, TUBERCULOUS PERITONITIS AND PERITONEOSCOPIC CHOLECYSTOGRAPHY). (E.) Antia, F. P. (BYL Nair Charity Hosp., Bombay, India), H. G. Desai and C. K. Deshpande. *Indian Pract.* 24(1):41-48, 1971.

10154 COMBINED HYPOTONIC DUODENOGRAPHY AND SCINTIGRAPHY FOR EXAMINATION OF THE PANCREAS IN CHILDREN. (It.) Randaccio, M. (Univ. Turin Pediatr. Clin., Italy), A. Balocco, M. M. Mauri and D. Bacolla. *Minerva Pediatr.* 23(24):1061-1064, 1971.

10155 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Venkataraman, M. S. (Govt. Gen. Hosp., Madras, India) and M. G. Varadarajan. *Mediscope* 14(3):113-122, 1971.

10156 ASSOCIATION OF LOW SERUM MAGNESIUM CONCENTRATION WITH SEVERITY OF GASTROINTESTINAL SYMPTOMATOLOGY IN THE IRRADIATED PATIENT. (E.) Tansy, M. F. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), F. M. Nichini, H. W. Baker and J. Chrzyanowski. *J. Surg. Res.* 11(5):213-216, 1971.

10157 DIAGNOSTIC ACCURACY OF X-RAY TV INDIRECT ROENTGENOGRAPHY OF THE STOMACH WITH EIGHTEEN FILMS. (Jap.) Watanabe, N. (Kyushu U., Sch. Med., Fukuoka, Japan). *Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.)* 31(3):286-306, 1971.

See also numbers: 10003, 10009, 10170, 10222, 10232, 10242, 10274, 10330, 10502, 10533, 10534, 10546, 10557, 10574, 10578, 10608, 10617, 10631, 10669, 10868

ESOPHAGUS

10158 ESOPHAGEAL HIATUS HERNIA AND MENTAL RETARDATION: LIFE-THREATENING POSTOPERATIVE METABOLIC ACIDOSIS AND POTASSIUM DEFICIENCY LINKED WITH A NEW INBORN ERROR OF NITROGEN METABOLISM. (E.) Kluge, T. (Univ. Hosp., Oslo, Norway), H. C. Børresen, E. Jellum, O. Stokke, L. Eldjarn and B. Fretheim. *Surgery* 71(1):104-109, 1972.

A case is reported of an 18-yr-old mentally retarded male who developed large hiatal hernia and esophagitis at 16 yr of age. He became refractory to conservative management, developing hematemesis and mediastinal pain. On admission he seemed in an adequate nutritional state and laboratory tests were essentially normal with a blood bicarbonate of 16 and a base excess of -10. Surgery through a left thoracotomy revealed a large sliding hernia with severe peri-esophagitis and extensive fibrosis of the posterior mediastinum. A modified Allison procedure was supplemented with a transdiaphragmatic gastropexy because of crural weakness. Nasogastric suction was performed during the initial postoperative period. His first postoperative week was uneventful, but from the tenth day onward he deteriorated rapidly with drowsiness, confusion and acidotic respiration. Arterial blood gases confirmed a severe metabolic acidosis of questioned etiology; on day 12 his pH was 7.2 and base excess was -20. With exacerbations and remissions this condition persisted for 2 weeks, requiring daily infusions of 450-600 mEq sodium bicarbonate. His postoperative kaliuresis and hypokalemia (1.6 mEq/liter) required daily replacement with 200-300 mEq. This acidosis could not be explained on a renal basis. Postoperatively he received a mean daily nitrogen intake of 8.8 g as a balanced synthetic amino acid solution. There was no relation between nitrogen supply and degree of acidosis. A spontaneous reversal of the metabolic acidosis on days 23 and 24 was accompanied by a marked drop in the production of pyroglutamic acid. By day 35 he was in his usual premorbid state. Follow-up studies revealed a persistence of abnormally high levels of glutamic acid derivatives in the serum. Other than occasional vomiting he was gastrointestinally asymptomatic. Two yr later, an upper respiratory infection was accompanied by a severe metabolic acidosis which required i.v. bicarbonate for 3 days.

10159 ESOPHAGOPLASTY WITH REVERSED GASTRIC TUBE. REVIEW OF FIFTY-THREE CASES. (E.) Heimlich, H. J. (Jewish Hosp., Cincinnati, Ohio). *Am. J. Surg.* 123(1):80-92, 1972.

A reversed gastric tube operation was performed in 53 patients over a period of 15 yr. The reversed gastric tube was anastomosed to the cervical esophagus in 42 patients; in 8 patients with carcinomatous involvement of the cervical esophagus, 6 of whom had tracheostomy, and in 1 patient with lye stricture, the reversed tube was anastomosed to the pharynx. Fifty of 53 patients recovered from the operation and 47 ate a regular diet. Thirty-two patients died of unrelated causes (pulmonary complications, metastatic carcinoma) after surviving from 1 month to 3.5 yr after the procedure. There were 3 deaths at 3, 5 and 11 days postoperatively, a mortality of 5.7%. Two frequent complications were 8 salivary fistulas at the cervical esophagogastric anastomosis and a narrowly constructed cervical anastomosis in 9 patients. The reversed gastric tube operation can be used for benign diseases (stricture, obstruction), esophagitis, lye stricture, congenital lesions (atresia), esophageal varices and carcinoma of the cervical esophagus. Replacement of the esophagus using the patient's own stomach avoids the immunity reaction that causes rejection of transplants. Furthermore, the reversed gastric tube, when used in children, grows at a normal rate.

10160 EROSION AS THE PRESENTING SYMPTOM IN HIATUS HERNIA. A CASE REPORT. (E.) Howden, G. F. (U. Bristol Dent. Sch., England). *Br. Dent. J.* 131(10):455-466, 1971.

A 50-yr-old male patient complained of right lower quadrant (mouth) pain brought on by hot, cold and sweet foodstuffs. Indications of gross erosion were seen in the 21/12 where the crowns were greatly reduced in size, and on the lower posterior molars and premolars where there was a loss of occlusal enamel. The case presented a good example of the effects of acid regurgitation on enamel with subsequent loss of dentine by abrasion, producing a loss of vertical height which could only be treated by crowning. The cause of the erosion was regurgitation for a period of over 2 yr.

10161 THE RESULTS OF SHUNT OPERATION FOR BLEEDING VARICES DUE TO INTRAHEPATIC OBSTRUCTION. (E.) Graham, K. J. (Green Lane Hosp., Auckland, N. Z.), B. G. Barratt-Boyes and D. S. Cole. *Surg. Gynecol. Obstet.* 134(1): 47-50, 1972.

Portosystemic shunt was carried out on 48 patients with esophageal varices secondary to intrahepatic obstruction. Among 36 nonemergency procedures, there were no hospital deaths, and of 12 emergency shunts performed to halt continued massive bleeding, there were 2 hospital deaths. Preoperative liver damage was moderate in 24 and severe in 9 patients. Of 8 patients in late postoperative encephalopathy, 4 died from hepatic failure within 1 yr. Hepatic failure was the most common cause of late death in 26 patients with recurrent variceal bleeding occurring in only 1 patient treated with a splenorenal shunt. Long-term survival was worse in patients who had an emergency procedure and in those with important liver impairment. Portocaval shunt is preferred to routine splenorenal shunt because it offers reliable portal decompression with a low risk of recurrent bleeding. The shunt is preferable as an emergency procedure to control massive bleeding.

10162 A SEARCH FOR NITROSAMINES IN EAST AFRICAL SPIRIT SAMPLES FROM AREAS OF VARYING OESOPHAGEAL CANCER FREQUENCY. (E.) Collis, C. H. (Guy's Hosp. Med. Sch., London), P. J. Cook, J. F. Foreman and J. F. Palframan. *Gut* 12(12):1015-1018, 1971.

Samples of alcoholic drinks were collected from a range of areas of East Africa where cancer of the esophagus occurs with moderate and low frequency and analyzed for the presence of nitrosamines by polarography, gas chromatography and mass spectrometry. There was no evidence by gas chromatography for the presence of methylethylnitrosamine, diethylnitrosamine, dipropylnitrosamine, ethylbutylnitrosamine, dibutylnitrosamine, or N-nitrosopiperidine. Traces of compounds with a retention time similar to dimethylnitrosamine were found, but mass spectrometric analysis revealed no evidence of dimethylnitrosamines. There was no apparent association between the gas chromatographic and polarographic results and no association between the levels of unknown constituents indicated by the two methods and the occurrence of cancer of the esophagus. Polarography proved to be too unspecific to be useful as an indicator of nitrosamines.

10163 RECONSTRUCTION OF THE ESOPHAGUS WITHOUT COLON TRANSPLANTATION IN CASES OF ATRESIA. (E.) Rehbein, F. (Pediatr. Surg. Hosp., Bremen, Germany) and H. Schweder. *J. Pediatr. Surg.* 6(6):746-752, 1971.

Ten children with esophageal atresia in which there was a large gap between the 2 segments and who underwent reconstruction without colon transplantation are reported. In 7 cases a direct anastomosis could be performed after elongation of the proximal segment by bouginage. In the other 3 cases, a gap of 1.5-2 cm remained after bouginage and mobilization of the 2 segments. This gap was bridged with a silver prosthesis in 1 case, the intervening tissue was crushed by means of 2 silver olives in another case, and in the third case, a canal, which could be dilated, formed around a Perlon thread. The data indicate that if by bouginage and subsequent mobilization during operation, the segments can be brought within 2 cm of each other, a transplant is no longer necessary.

10164 EVALUATION OF COLONIC REPLACEMENT OF THE ESOPHAGUS IN CHILDREN. (E.) Schiller, M. (Hadassah U. Med. Ctr., Jerusalem), T. R. Frye and E. T. Boles, Jr. *J. Pediatr. Surg.* 6(6):753-760, 1971.

Twenty-nine children who underwent colonic replacement of the esophagus for atresia, stricture or varices were evaluated with particular reference to postoperative complications and follow-up of clinical and radiologic evaluation. The incidence of early postoperative complications was high, with leaks at the cervical esophagocolic anastomosis occurring in approximately one-third of the cases; however, mediastinal sepsis did not occur. There were no deaths in this group of patients; however, one failed because of vascular insufficiency of the transplant. The long-term results showed no evidence of acid-peptic colitis or other disease in the interposed segment. The clinical evaluations were satisfactory in about 80% of the cases, but significant problems of pulmonary or intestinal symptoms with poor growth were found in 4 children, 3 of whom had slowly emptying transplants. Redundancy of the transplant occurred in about a third of the cases, but this alone did not appear to affect the results. The results indicate that isoperistaltic and antiperistaltic segments work equally well in this procedure.

10165 EFFECTS OF POSTURE IN HIATUS HERNIA AS STUDIED BY OESOPHAGEAL pH MEASUREMENT. (E.) Habibulla, K. S. (Queen Elizabeth Hosp., Birmingham, England), J. F. Ammann and J. Leigh Collis. *Thorax* 26(6):689-695, 1971.

Twenty hiatus hernia patients with symptomatic and radiological reflux (Group A) and 10 patients with hiatal hernia and peptic stricture of the esophagus (Group B), prior to dilatation being performed were studied. In both groups the mean number of reflux episodes below pH 5 was greater when patients were sitting up than when lying down. The percentage of time with increased esophageal acidity was slightly greater when sitting than lying in both groups. In Group A, the mean duration of each reflux episode was only 3.4 min in the sitting position, while in the lying position, it was 11.8 min, a highly significant difference. Similar results were seen in Group B. No correlation was seen between total number of reflux episodes, percentage of time with increased esophageal acidity under pH 5, and the mean episode duration and symptom score obtained from history and esophagoscopy findings. Undoubted symptomatic relief derived by hiatus hernia patients from adopting the sitting position is explained by improved clearance of regurgitated acid.

10166 POSTVAGOTOMY DYSPHAGIA. REPORT OF A CASE WITH PERIESOPHAGEAL FIBROSIS. (E.) Hoyumpa, A. M., Jr. (VA Hosp., Nashville, Tenn.), J. T. Morrison and M. Moskowitz. *Am. J. Gastroenterol.* 57(2):133-138, 1972.

This is a report of a case of in a 56-yr-old woman with postvagotomy dysphagia which was persistent and required surgery. Dysphagia with regurgitation began 2 weeks after surgery and worsened; progressive weight loss was noted. Barium swallow revealed an obstruction just above the diaphragm. The mucosal pattern was normal on esophagoscopy and by biopsy. An obstruction was encountered at a distance of 42 cm and did not yield with the instrument. The Hollander test indicated vagotomy to be complete and bougienage over a 2-month period was unsatisfactory. Thoracotomy was performed and a 1-cm wide fibrous stricture that encircled the esophagus at the diaphragm was divided. The esophagus immediately expanded and the patient regained her preoperative weight within 4 weeks. This case is an example of postvagotomy dysphagia due to peri-esophageal fibrosis. True achalasia was ruled out because of the strong peristalsis that was noted with barium swallow and the persistence of the symptoms suggested fibrosis rather than simple neurogenic dysphagia. Surgical trauma should be avoided to prevent peri-esophageal fibrosis and vagotomy should be close to the diaphragm to minimize motility dysfunction.

10167 LEUCOMETHYLENE BLUE STAINING DURING VAGOTOMY. (E.) Jensen, H.-E. (Municipal Hosp., Copenhagen), J. Nielsen, P. Poll and E. Amdrup. *Acta Chir. Scand.* 137(5):451-453, 1971.

The completeness of vagotomy was tested in 37 patients using leucomethylene-blue to stain the fine vagal twigs in the esophageal tissue. After meticulous dissection, additional nerve-like tissue was nevertheless found in 28 of 37 cases, though in 9 cases there was no histological confirmation. The nerves were often very fine, but on occasion larger nerves partly buried in the muscle of the esophageal wall were found. The anatomically complete vagotomy in the leucomethylene-blue-group did not alter the postoperative reduction in fasting secretion or basal secretion as compared with the control group. There were 5 positive on insulin testing in the control group and 4 in the leucomethylene-blue-group, but no other difference in acid secretion during insulin stimulation was observed between the 2 groups. The uncut nerve twigs found in the esophageal muscularis may not be involved in the innervation of gastric parietal cells.

10168 SUBMUCOSAL DISSECTION OF THE ESOPHAGUS. (Ger.) Kaude, J. (Univ. Clin., Lund, Sweden) and P. Olafsson Riba. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):537-539, 1971.

10169 TREATMENT OF ESOPHAGEAL VARICES IN PRE-HEPATIC PORTAL HYPERTENSION BY VOSS-SCHULTE'S TECHNIC OF DISSECTION LIGATION. (Ger.) Booss, D. (Hosp. Pediatr. Surg. Clin., Bremen, Germany), H. Kolb and F. Rehbein. *Z. Kinderchir.* 10(2):192-203, 1971.

10170 INDICATIONS FOR AND VALUE OF THE SECTORIAL MEASUREMENT OF pH MEASUREMENTS DURING PROGRESSIVE WITHDRAWAL OF THE HEAD. (Ger.) Kothe, W. (Karl Marx U., Surg. Clin., Leipzig, Germany), H. Albert, K. Nowotny and J. Walther. *Zentralbl. Chir.* 96(32):1089-1091, 1971.

10171 TRAUMATIC PERFORATIONS OF THE OESOPHAGUS. (E.) Bertelsen, S. (Univ. Hosp., Copenhagen). *Scand. J. Cardiovasc. Surg.* 5(1): 103-110, 1971.

10172 SPONTANEOUS EOSOPHAGEAL RUPTURE. AN EVALUATION OF THE RESULTS OF TREATMENT 1944 TO 1969. (E.) Blichert Toft, M. (Copenhagen County Hosp., Gentofte, Denmark). *Scand. J. Cardiovasc. Surg.* 5(1):111-115, 1971.

10173 SURGICAL PREVENTION OF SEQUELAE OF INCOMPETENCE OF THE CARDIA. (Cz.) Langer, L. (Charles U. Sch. Gen. Med., Prague), J. Lhotka and J. Setka. *SB. Lek.* 73(8):222-224, 1971.

10174 IDIOPATHIC ESOPHAGESTASIS. I. ITS PATHOGENIC AND PATHOPHYSIOLOGIC STUDY. (Jap.) Sato, H. (U. Chiba Sch. Med., Japan) and T. Hirashima. *Kyobu Geka (Jap. J. Thorac. Surg.)* 24(3):172-178, 1971.

10175 EMERGENCY MANAGEMENT OF ACUTE PROFUSE BLEEDING FROM ESOPHAGEAL VARICES. (Pol.) Zajac, S. (Med. Acad. Ist Surg. Clin., Warsaw, Poland), J. Walaszewski, J. Szczerban and J. Nielubowicz. *Pol. Przegl. Chir.* 43(7): 1145-1149, 1971.

10176 BENIGN TUMORS OF THE ESOPHAGUS. (Sp.) Allamand, J. (J.J. Aguirre Hosp., Santiago, Chile), A. Larrain, J. Tocornal and A. Ubilla. *Prensa Med. Argent.* 58(29):1477-1483, 1971.

10177 PSEUDODIVERTICULA OF THE ESOPHAGUS. (Pol.) Jasienski, S. (Milit. Hosp., Cracow, Poland) and M. Jakimowicz. *Pol. Przegl. Chir.* 43(7):1139-1143, 1971.

10178 THE REMOTE RESULTS OF RADICAL TRANS-PLEURAL OPERATIONS IN CARDIOESOPHAGEAL CANCER. (Rus.) Kleschevnikova, V. P. *Khirurgiia (Mosk.)* 47(8):25-29, 1971.

10179 EMERGENCY VENOUS ANASTOMOSIS FOR BLEEDING ESOPHAGEAL VARICES. (Pol.) Gacyk, W. (Med. Acad. Inst. Surg., Gdansk, Poland),

O. Jankau and J. Dybicki. *Pol. Przegl. Chir.* 43(7):1125-1128, 1971.

10180 DOWNHILL VARICES: ESOPHAGEAL VARICES WITHOUT PORTAL HYPERTENSION. (Ger.) Gerstenberg, E. (Free U. Steglitz Clin., Berlin), V. Taenzer, D. Bachmann and P. Wollgens. *Med. Welt* 22(37):1433-1436, 1971.

10181 ANGINA PECTORIS AND HIATUS HERNIA. (Fr.) Rousseau, G. *J. Med. Poitiers* 2(3):145-147, 1971.

10182 DYSPHAGIA. (E.) Phillips, M. M. (Johns Hopkins Hosp., Baltimore, Md.) and T. R. Hendrix. *Postgrad. Med.* 50(4):81-86, 1971.

10183 ESOPHAGEAL ATRESIA IN TWINS. ESOPHAGEAL ATRESIA WITH TRACHEO-ESOPHAGEAL FISTULA OCCURRING IN MULTIPLE BIRTH. (E.) Farha, S. J. (St. Francis Hosp., Wichita, Kans.), C. H. Diener and P. R. Block. *J. Kans. Med. Soc.* 72(9):386-389 & 392, 1971.

10184 STRANGULATED HIATUS HERNIA. REPORT OF TWO CASES. (Fr.) Chalnot, P. (Cent. Reg. Hosp., Nancy, France), P. Mathieu and G. Fieve. *J. Chir. (Paris)* 102(3):175-184, 1971.

10185 GERIATRIC EMERGENCY SURGERY FOR NON-TRAUMATIC LESIONS OF ESOPHAGUS, STOMACH AND DUODENUM. (It.) Masera, N. (Inst. Geriatr., Ancona, Italy) and N. Massaioli. *G. Gerontol.* 19(Suppl. 45):39-78, 1971.

10186 TWO UNCOMMON DIVERTICULA OF THE SUPRADIAPHRAGMATIC ESOPHAGUS. (Ger.) Hebestreit, H. P. (Inst. Roentgenol., Mannheim, Germany) and J. Lutgemeier. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):540-541, 1971.

10187 BENIGN ESOPHAGEAL STENOSES IN ECTOPIC GASTRIC MUCOSA. (Ger.) Hebestreit, H. P. (Roentgenol. Inst., Mannheim, Germany), F. Asmar and J. Lutgemeier. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):419-423, 1971.

10188 EXPERIMENTAL STUDY ON THE SECUREMENT OF ESOPHAGEAL ANASTOMOSIS BY A PEDICLE FLAP OF DIAPHRAGM. (Ger.) Bunte, H. (U. Erlangen Surg. Clin., Germany), J. Hunger, D. Raithel and E. Hoffmeister. *Chirurg* 42(9):402-403, 1971.

10189 SURGICAL TREATMENT OF CARCINOMA OF THE OESOPHAGUS AND CARDIA. (E.) Collis, J. L. (Queen Elizabeth Hosp., Birmingham, England). *Br. J. Surg.* 58(10):801-804, 1971.

10190 CANCER OF THE STOMACH AND OESOPHAGUS. DATA CONCERNING MANAGEMENT AND RESULTS. (E.) Burn, J. I. (Hammersmith Hosp., London). *Br. J. Surg.* 58(10):798-800, 1971.

10191 THE VALUE OF RADIOTHERAPY IN THE MANAGEMENT OF SQUAMOUS OESOPHAGEAL CANCER. (E.) Pearson, J. G. (Roy. Infirm., Edinburgh, Scotland). *Br. J. Surg.* 58(10):794-798, 1971.

10192 EPIDEMIOLOGY OF CANCER OF THE OESOPHAGUS AND STOMACH. (E.) Langman, M. J. S. (Gen. Hosp., Nottingham, England). *Br. J. Surg.* 58(10):792-793, 1971.

10193 PRIMARY MELANOCARCINOMA OF THE ESOPHAGUS. (E.) Bingham, D. L. C. (Queen's U., Kingston, Ontario, Canada), L. C. Chadsey, S. Ramchand and P. J. Doris. *Can. Med. Assoc. J.* 105(6):607-610 & 642, 1971.

10194 RADIOLOGIC AND ENDOSCOPIC STUDY OF ESOPHAGEAL MYCOSES. (Fr.) Bret, P. (Edouard Herriot Hosp., Lyon, France), A. Anjou and B. Moulinier. *Ann. Radiol. (Paris)* 14(9-10):759-763, 1971.

See also numbers: 9965, 10138, 10139, 10570, 10754, 10863

10195 TRANSMURAL GASTRIC ASPIRATION IN GASTROINTESTINAL SURGERY BY MEANS OF A TEMPORARY GASTROSTOMY EXECUTED FOR THIS PURPOSE. (It.) Tuscano, G. (U. Modena Inst. Spec. Surg. Pathol., Italy), E. Cacciatore, R. Tateo, E. Amenta and M. Abbate. *Gazz. Int. Med. Chir.* 76(18):1131-1140, 1971.

Temporary gastrostomy, involving a minimal incision and passage of a sound, was performed in 70 cases of abdominal surgery, including 23 vagotomies, 19 interventions in the biliary tract, 9 gastric resections and 19 other cases (including 5 each of portacaval anastomosis and colorectal surgery), with postoperative drainage maintained without difficulty for periods as long as 16 days. Wound healing, following withdrawal of the sound, was usually complete within 6 days, with only 2 of 70 patients showing a significant delay in this respect. A discussion of the relative advantages and disadvantages of this technique (described in detail) concludes that it is both more desirable and demonstrably much safer than gastric aspiration by means of a transnasal tube, whenever gastric aspiration is indicated in connection with abdominal surgery.

10196 ADDITIONAL EXPERIENCE WITH ELIMINATION OF ROUTINE NASOGASTRIC SUCTION FOLLOWING GASTRIC OPERATIONS. (E.) Herrington, J. L., Jr. (Vanderbilt U. Med. Ctr., Nashville, Tenn.). *Surgery* 71(1):132-135, 1972.

Subjects in this 9-yr study consisted of 904 patients who underwent vagotomy-antrectomy or vagotomy-pyloroplasty for gastroduodenal ulcers in whom routine postoperative nasogastric suction was not employed. Surgery was on an emergency basis in 89, elective in 815. Postoperative decompression (in 13% of the total group) was necessary in 62 of the elective cases (7.6%) and in 56 of the emergency cases (63%). Most of the patients requiring postoperative suction had presented technical problems at surgery suggesting the possibility of development of postoperative anastomotic leakage or duodenal stump blow-out. In a few nasogastric suction was performed because of postoperative abdominal distention or nausea and vomiting.

10197 ANTRAL MUCOSAL MEMBRANE. A CONGENITAL OBSTRUCTING LESION OF THE STOMACH. (E.) Brandon, F. M. (U. Oklahoma Med. Ctr., Oklahoma City) and W. A. Weidner. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 114(2): 386-389, 1972.

A 4-month-old infant proved to have an antral mucosal membrane with a 3-mm central perforation. Barium meal examination revealed a crescentic curvilinear defect in the gastric antrum 3 cm. proximal to the pylorus. The pylorus and duodenal bulb were normal as was the small intestine pattern. The stomach was not distended and there was no delay in emptying. A gastrotomy was made over the body of the stomach and a pyloroplasty was performed after excision of the membrane. Microscopically the membrane showed no evidence of fibrosis. In a child with an unusual pattern of vomiting that does not clinically resemble hypertrophic pyloric stenosis, an antral membrane should be considered in the differential diagnosis. The importance of the technique of the roentgen examination is stressed. Thus, this is a rare congenital obstructing lesion of the stomach which has characteristic roentgenographic findings.

10198 GASTROINTESTINAL FUNCTION IN IRON DEFICIENCY STATES IN CHILDREN. (E.) Ghosh, S. (Safdarjung Hosp., New Delhi, India), S. Daga, D. Kasthuri, R. C. Misra and H. K. Chuttani. *Am. J. Dis. Child.* 123(1):14-17, 1972.

Sixteen of 30 children with iron-deficiency anemia had an associated hookworm infection, and in 14 the anemia was due to dietary iron deficiency. In 14 anemic patients, regardless of etiology, basal as well as maximal acid secretions were less than those of controls. Two patients with hookworm anemia had complete histamine-fast achlorhydria. Most anemic patients had normal average fecal fat excretion except for 2 with non-hookworm anemia who had no other evidence to suggest malabsorption. Borderline jejunal biopsy abnormalities were seen in 4 of 20 anemic patients; no severe mucosal damage was seen. In children with hookworm infestation, anemia seemed much more important than damage wrought by hookworms in reducing acid secretion by the stomach.

10199 DIRECT VISION BRUSH CYTOLOGY IN THE DIAGNOSIS OF GASTRIC DISEASE. (E.) Liavag, I. (Deaconess Hosp., Oslo, Norway), J. Marcussen and A. Serck-Hanssen. *Acta Chir. Scand.* 137(7):682-688, 1971.

Brush cytology as an aid in the diagnosis of gastric disease was evaluated in 147 patients who had radiologic evidence of gastric lesions or clinical symptoms suggesting gastric disease. In 27 patients with gastric malignancy, malignant or suspect cells were found in 96.3%. One false negative test and 5 inconclusive tests seemed due to inadequate brushing and it is recommended that at least 2 brushings, 1 pre-biopsy and 1 post-biopsy, be taken. The brush cytology was unequivocally negative for malignant cells in 87.5% of the 120 patients with benign gastric lesions. The cytology was suspect in 10% and false positive in 2.5%. The diagnosis of benign gastric disease was verified histologically in 33 patients and correlated with a 82% correct reading (27 cases) of no malignant cells, with a 12% suspect reading and a false positive in 2 patients (one of whom had a pre-malignant lesion). This form of cytology, when properly used, ranks second to biopsy in accuracy and reliability and has advantages over blind gastric washings. The procedure can be performed with endoscopy, allows for selection of the site, contains more cellular elements, of a better preserved nature, with no contamination of the brush from the respiratory and proximal alimentary tract.

10200 A FAMILY STUDY OF CHRONIC GASTRITIS: HISTOLOGICAL, IMMUNOLOGICAL AND FUNCTIONAL ASPECTS. (E.) Varis, K. (U. Helsinki 2nd Dept. Med.). *Scand. J. Gastroenterol.* 6(Suppl. 13): 1-56, 1971.

Subjects consisted of 109 first- and second-degree relatives of 9 probands with severe atrophic gastritis. There was a significant elevation of the prevalence of chronic gastritis in 16-30-yr-old first-degree relatives and of the prevalence of severe atrophic gastritis in 31-65-yr-old first-degree relatives of the probands compared with 142 random controls; second-degree relatives did not differ from controls. Milder forms of atrophic gastritis occurred more rarely in first-degree relatives than in controls. The value of heritability for severe atrophic gastritis was 79.5%± 25.2%. Consumption of tobacco, alcohol and coffee did not correlate with the occurrence of chronic gastritis. The distribution of parietal cell antibodies seemed governed by an autosomal dominant gene with incomplete penetrance. Slight atrophy of gastric body glands alone caused only a slight decrease in vitamin B_{12} absorption. Antibodies against intrinsic factor occurred only with severe atrophic gastritis and severe malabsorption of vitamin B_{12}. ABO blood groups and secretor character did not correlate with chronic gastritis.

10201 GASTRIC RETENTION IN DIABETES MELLITUS. REPORT OF A CASE. (E.) Liavåg, I. (Deaconess Hosp., Oslo, Norway) and S. Tönjum. *Acta Chir. Scand.* 137(6):593-597, 1971.

A report of a case, in a 35-yr-old female, of gastric retention for which no organic lesion of the pyloric region could be found, either radiographically or at operation. Recordings of intragastric pressure revealed a condition similar to that in vagotomized patients. The patient was treated successfully with a gastrojejunostomy. The case is of particular interest because the patient had been a diabetic for 24 yr and it is concluded that the gastric retention was probably due to diabetic neuropathy affecting the vagal nerve. Her history included the development of a progressive arthropathy in both ankle joints that started in 1958 (8 yr after diagnosis) and progressed until in 1963 her right leg was amputated 10 cm below the knee. In 1966 a cataract developed in her right eye; in 1969 retinal bleeding resulted in severe impairment. She had been hospitalized 23 times because of diabetic complications and had been hypertensive for many years. On this admission a neurologist diagnosed a diabetic encephalomyeloneuropathy. The gastrointestinal symptoms of nausea and vomiting, due to gastric retention, had been noted for about a yr and had caused the patient to loose 16 pounds.

10202 TREATING GASTRIC WOUNDS IN RATS WITH ALPHA-CYANOACRYLATE ADHESIVES. (Ger.) Noszczyk, W. (Inst. Med. Education, Warsaw, Poland), W. Kurnatowski, M. Kałcak, M. Kulicki and M. Szretter-Szmid. *Z. Exp. Chir.* 4(5):313-317, 1971.

In rats bearing experimental incisions of the stomach wall, closure of the incisions by topical application of the ethyl-2, n-butyl-2, or amyl-2 ester of α-cyanoacrylic acid gave entirely satisfactory results, followed by uncomplicated wound healing, in addition to requiring much less time than conventional suturing. Subsequent histopathologic studies, after periods of 201-250 days, gave no indication of carcinogenic or other, local or systemic, side effects. However, intervening, sequential necropsies showed slight delay in the formation of scar tissue, as compared to conventional suturing, suggesting that the chief clinical application of this technique may be its use to reinforce potentially weak sutures.

10203 ENZYME CYTOCHEMISTRY OF THE ABRADED GASTRIC SURFACE EPITHELIUM. AN AID IN THE DIAGNOSIS OF EARLY ATROPHIC GASTRITIS AND FOCAL INTESTINAL METAPLASIA. (E.) Leitao, O. (New York Med. Coll., N. Y.) and G. B. J. Glass. *Am. J. Dig. Dis.* 16(9):769-781, 1971.

Enzyme cytochemistry of the abraded gastric mucosa was determined on 49 individuals, and results presented as a new and superior procedure in the study of atrophic gastritis. The superfical epithelium of the gastric mucosa was abraded by conventional cytologic brush technique. Enzyme cytochemistry was then correlated with the histology and cytology of the gastric mucosa, as obtained by conventional technique. In 31 of the patients enzyme histochemical studies of the epithelium, obtained by gastric suction biopsy correlated with the smears of the abraded mucosa. Five enzymes were determined: alkaline, and acid phosphatase, leucine amino peptidase, LDH, and diphosphopyridine nucleotide diaphorase. This method is superior in recognizing early atrophic lesions and in diagnosing focally distributed intestinal metaplasia. This recognition is important in the early detection or prevention of gastric carcinoma.

10204 SMOKING HABITS OF PATIENTS WITH GASTRIC CANCER. (E.) Zacho, A. (Finsen Inst., Copenhagen), J. Nielsen and V. Larsen. *Acta Chir. Scand.* 137(5):455-458, 1971.

The relationship between smoking and gastric cancer was studied in 532 patients with gastric cancer and the results were compared with the results of a study on the smoking habits of 35,018 persons. The incidence of smoking among men and women corresponded well with the relative incidence of gastric cancer in the two sexes. In men, the gastric cancer patients included 89.0% who had ever smoked against 87.2% in the general population. The 2 groups showed opposite trends regarding the percentage distribution of smokers in the various age groups. There was a relatively high percentage of smokers among the youngest age groups of the gastric cancer patients, a relatively low percentage in the 50-60 age range, while thereafter was an even increase. The percentage of smokers 5 yr before admission was higher in the gastric cancer group than in the controls. As far as women were concerned, there was a lower percentage of ever-smokers in the gastric cancer group (36.0%) than in the controls (45.5%). Analysis of the individual age groups showed the same percentage of ever-smokers at an age below 60, but a lower percentage in the older age groups. Five yr before admission there was a higher percentage of smokers in the gastric cancer than the control group. Retrospective studies seem to be of little use in analyzing the relationship between smoking and gastric cancer since many people who develop this disease often react by altering their smoking habits.

10205 A LUMINESCENCE MICROSCOPIC STUDY OF LAVAGE FLUID IN GASTRIC CANCER. (Rus.) Kozlovskii, I. I. (Reg. Oncol. Dispensary, Vitebsk, USSR) and A. V. Zelenin. *Vopr. Onkol.* 17(6):19-24, 1971.

10206 EXFOLIATIVE GASTRIC CYTOLOGY. CLINICAL EXPERIENCE DURING A 5-YR PERIOD. (Nor.) Fausa, O. (Ulleval Hosp., Oslo, Norway). *Tidsskr. Nor. Laegeforen.* 91(24):1745-1747 & 1769, 1971.

10207 REGULATION OF GASTRIC BLOOD FLOW. (Nor.) Gautvik, K. M. (U. Oslo Inst. Physiol, Norway). *Tidsskr. Nor. Laegeforen.* 91(24):1739-1744 & 1769, 1971.

10208 ECZEMATOUS DISEASES AND CHANGES IN THE GASTRIC MUCOSA. (Ger.) Steinacher, J. (Univ. Clin. Dermatol. Venerol., Graz, Austria) and R. Heschl. *Z. Haut. Geschlechtskr.* 46(19): 602-606, 1971.

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10210 NEUROLOGIC AND NEURO-ENDOCRINE HUMORAL DISORDERS IN PATIENTS WITH THE POSTGASTRECTOMY DUMPING SYNDROME. (Rus.) Ischenko, M. M. *Zh. Neuropatol. Psikhiatr. Korsakov.* 71(5): 683-690, 1971.

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See also numbers: 10111, 10117, 10141, 10157, 10189, 10190, 10192, 10414, 10549, 10564

10266 GASTRIC ULCERS INDUCED BY A COMBINATION OF ULCEROGENIC MEDICATIONS AND RESTRAINT. (Fr.) Cosen, J.-N. (Natl. Inst. Health, Buenos Aires, Argentina) and R.-H. Cosen. *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):345-350, 1971.

Thirty minutes before sacrifice, physiologic saline, phenylbutazone (200 mg/kg), 5-pyrazolone sulfonate (200 mg/kg), aspirin (100 mg/kg), reserpine (50 mg/kg) or methylprednisolone (2.5 mg/kg) were administered by gastroesophageal sound to rats just released from 4 hr of restraint. As compared to the controls receiving saline, phenylbutazone was ulcerogenic at a level of greater statistical significance than aspirin or 5-pyrazolone sulfonate, while reserpine and methylprednisolone were ulcerogenic at a level of very low statistical significance. In all cases, animals with access to a sweetened fluid during restraint developed less severe ulceration than those which were deprived of both food and fluid. The technique is suggested as a method for rapid pharmacologic screening of new compounds.

10267 THE PROPRIETY OF GASTRECTOMY AND GASTRODUODENAL ANASTOMOSIS IN THE TREATMENT OF POSTBULBAR DUODENAL ULCERS. (Fr.) Dubois, F. (HUIP, Paris), G. Grenier, J. Rousselet and J. Toulet. *Arch. Fr. Mal. App. Dig.* 60(12): 629-634, 1971.

Forty-four patients with postbulbar duodenal ulcers accompanied by stenosis or serious hemorrhagic complications were treated by vagotomy and antrectomy or hemigastrectomy, followed by a "cupping glass" anastomosis so contrived that the undissected ulcer was excluded from the digestive tract, with the anastomosis resting on its distal surface and the ulcer crater covered over by the gastric wall. There were no significant postoperative complications. At the time of report there had been no recurrence of ulcer or serious functional difficulties in 21 of 22 patients who could be followed for periods of 2-7 yr. Minor functional difficulties included milk intolerance (10 of 21), diminished appetite (3 of 21) and (8 of 21, each) inability to eat a full meal, postprandial sensations of fullness, and intermittent diarrhea (triggered in 6 of 8 by drinking milk). After 4 yr of apparently complete recovery, the twenty-second patient developed postprandial pain and a weight loss of 20 kg over 2 yr, both of unexplained origin in the absence of X-ray or other confirmation of recurrence of the ulcer.

10268 THERAPEUTIC IMPLICATIONS OF DISTURBED GASTRIC PHYSIOLOGY IN PATIENTS WITH STRESS ULCERATIONS. (E.) Lucas, C. E. (Wayne State U. Sch. Med., Detroit, Mich.), C. Sugawa, W. Friend and A. J. Walt. *Am. J. Surg.* 123(1): 25-34, 1972.

The photographic gastric mucosal changes ranged from widespread mottled area of pallor and hyperemia through small discrete erosions to superficial ulcers measuring up to 10 cm in diameter. These changes were found exclusively in the acid secreting mucosa and began in the first 24 hr after injury. Intraluminal gastric mucus concentration increased in amount when stress persisted beyond 3 days. The average concentrations of sialic acid, hexosamine, and total hexoses was slightly decreased in the stress patients; no difference was present in the intracellular concentrations of mucus in control and stress patients. Premonitory signs prior to the onset of hemorrhage include hypersecretion of gastric acid with an increase of volume, black flecks of altered blood and bile in the gastric juice and an accentuation of adynamic ileus. Forty-four patients in whom vigorous iced saline lavage did not successfully control hemorrhage required operation. Although not improving the survival rate, vagotomy and partial gastrectomy were the most successful procedure in preventing postoperative bleeding.

10269 INTRAOPERATIVE RELATION OF GASTRIC SECRETION ACIDITY AND COMPLETE VAGOTOMY. (E.) Grassi, G. (San Giovanni Hosp., Rome), C. Orecchia, I. Cantarelli and B. Sbuelz. *Surg. Gynecol. Obstet.* 134(1):35-38, 1972.

An intraoperative test for the completeness of vagotomy, based on pH variations of the gastric secretions following histamine stimulation, is described. Of 80 patients undergoing selective vagotomy, in 69 the gastric pH over the entire mucosa ranged from 5.5-7, and in 7 patients small areas of the fundus showed low pH values of 1.2-2.2, with surrounding areas of pH 6.2. Section of a terminal branch of the vagus nerve innervating the area of acid mucosa caused a prompt increase of the pH level to 6.2. The same measureable responses occurred in a group of 20 in whom an intentionally incomplete vagotomy was performed and in 20 patients who had a mucosal or traditional antrectomy performed first. This intraoperative test is useful in that it assesses completeness of vagotomy, the efficacy of vagotomy and improves the results of highly selective vagotomy.

10270 POTENTIATION, BY NICOTINE, OF DUODENAL ULCERS IN THE RAT. (E.) Robert, A. (Upjohn Co., Kalamazoo, Mich.). *Proc. Soc. Exp. Biol. Med.* 139(1):319-322, 1972.

After an overnight fast, female Upjohn rats (derived from the Sprague-Dawley strain) received a s.c. infusion (at a rate of 13 ml/24 hr) of pentagastrin (2 µg/kg/min) plus carbachol (0.1 µg/kg/min). Controls received only these 2 agents, while experimental rats received, in addition, graded doses of nicotine (5-40 µg/kg/min) in the same infusion mixture. A few more controls received nicotine alone at an infusion rate of 20 or 40 µg/kg/min. Animals were sacrificed after 24 hr of infusion and the stomach and duodenum examined. Nicotine markedly increased the incidence of duodenal ulcers as well and the severity and number of ulcers per rat. There was a dose-dependent relationship with respect to the number of ulcers per rat and the severity of the lesions. At nicotine doses of 5 and 10 µg/kg/min only duodenal ulcers were found, while at 20 and 40 µg/kg/min the incidence of ulceration of the gastric corpus was 20 and 70%, resp. The incidence of duodenal ulceration with nicotine doses of 0, 5, 10, 20 and 40 µg/kg/min was 36, 75, 80, 90 and 90%, resp. No ulcers were seen with the administration of nicotine alone.

10271 THE INFLUENCE OF CAERULEIN-LIKE PEPTIDES ON GASTRIC SECRETION AND PEPTIC ULCER FORMATION IN CATS. (E.) Konturek, S. J. (Med. Acad. Inst. Physiol., Cracow, Poland), T. Radecki, J. Biernat and P. Thor. *Digestion* 5(1):1-8, 1972.

Dose response curves of acid output stimulated by pentagastrin, natural caerulein and 3 synthetic caerulein-like peptides were obtained in 10 conscious cats with gastric fistulas. Natural caerulein produced similar maximal acid response as that obtained with pentagastrin; synthetic caerulein-like peptides were slightly less effective than pentagastrin. Natural caerulein infused in a constant dose of 0.4 µg/kg/hr against varying background doses of pentagastrin caused some increase in the gastric response to lower doses of pentagastrin. Maximal response to pentagastrin was sharply decreased by the addition of caerulein due to duodenal content reflux. Natural caerulein added in a dose of 0.8 µg/kg/hr and synthetic caerulein-like peptides added in a dose of 3.2 µg/kg/hr to pentagastrin infusion prevented the production of or reduced the diameter of duodenal ulcerations by pentagastrin. This effect may be due to the increase in gastric juice neutralization in the duodenum.

10272 THE ROLE OF DISTAL GASTRECTOMY, WITH AND WITHOUT VAGOTOMY, IN THE CONTROL OF CEPHALIC SECRETION AND PEPTIC ULCER DISEASE. (E.) Stempien, S. J. (VA Hosp., Long Beach, Calif.), E. R. Lee and A. E. Dagradi. *Surgery* 71(1):110-117, 1972.

Subjects consisted of 82 male patients admitted for postoperative sequelae following either Billroth I or II gastrectomy with and without vagotomy. All underwent the insulin or tolbutamide test for the assessment of the cephalic phase of gastric secretion (the vago-antral pathway). Subjects were studied from 2 months to 21 yr (mean 5.5 yr) after surgery. Surgery consisted of antrectomy alone in 28 (10 Billroth I, 18 Type II) and antrectomy-vagotomy in 54 (40 Type II, 14 Type II). As reported previously, negative results in the tests were associated with absence of recurrent ulcer disease, positive results with recurrent ulcer disease. No recurrent ulcer disease was seen in 10 with borderline tests, 6 with antrectomy-vagotomy (I, 4; II, 2) and 4 with antrectomy alone (2 each type). A mean 50% Billroth I and a mean 60% Billroth II gastrectomy, with a mean lesser curvature of 8.75 cm, seemed inadequate to control cephalic secretion, while a mean type I or II gastrectomy of 74% with a mean lesser curvature of 5 cm controlled cephalic secretion and prevented ulcer recurrence. Overall there was protective effect of vagotomy, no matter how inadequate the gastrectomy. There were 7 recurrent ulcers in 28 with antrectomy alone and 3 recurrences in those with vagotomy-antrectomy. Adequate distal gastrectomy without vagotomy did abolish cephalic secretion. In 13 Billroth II patients with positive tests, X-ray revealed a retained pyloric segment in 5 (1 with, 4 without vagotomy), all of whom had evidence of stomal ulceration. A single case is reported to illustrate that vagotomy may protect against recurrent ulcer, in spite of the presence of retained pyloric mucosa.

10273 DOSE RESPONSE OF GASTRIC ACID TO INSULIN IN PATIENTS WITH DUODENAL ULCER. (E.) Baron, J. H. (Roy. Postgrad. Med. Sch., London), D. J. Cowley, L. V. Gutierrez, F. I. Iweze, J. Spencer and J. Tinker. *Gastroenterology* 62(2): 203-206, 1972.

Patients with duodenal ulcer were given i.v. injections of 0.1, 0.2 and 0.4 U/kg of insulin on different days. In each of 8 patients the peak acid output after 0.2 U/kg insulin was higher than after 0.1; the mean peak acid output of 17 patients with duodenal ulcer after 0.2 U/kg was higher than after 0/4 U/kg. The mean lowest blood glucose levels after 0.1 and 0.2 U were identical (20 mg%). The mean lowest blood glucose after 0.4 U was significantly lower than that after 0.2 U. Insulin-stimulated acid secretion is not an all or none phenomenon but is dose-related and also hypoglycemia related. An optimum dose of insulin for gastric function tests is that dose which lowers the blood glucose sufficiently to allow near-maximum vagal stimulation to occur without producing so low a blood glucose that acid secretion is depressed. A desirable blood glucose concentration range is 15-25 mg%.

10274 THE INFLUENCE OF THE INDIVIDUAL SURGEON AND OF THE TYPE OF VAGOTOMY UPON THE INSULIN TEST AFTER VAGOTOMY. (E.) Johnston, D. (Gen. Infirm., Leeds, England) and J. C. Goligher. *Gut* 12(12):963-967, 1971.

Insulin tests were performed early in the postoperative period in 676 patients who had undergone truncal or bilateral vagotomy and drainage for duodenal ulcer to assess the influence of the surgeon's experience and to compare the effects of selective and truncal vagotomy. Consultants did not fare significantly better than more junior staff members, the vagotomies being incomplete in 17.6% and 12.2% of the cases, resp. The ability to achieve a complete vagotomy varied widely from surgeon to surgeon, regardless of his status. A positive insulin test, indicative of an incomplete vagotomy, was found in 15.7% of 515 patients with truncal vagotomy and 14.3% of 161 patients after selective vagotomy. "Early" positive responses (within 1 hr of insulin injection) were seen in 5.6% of the former group and 3.1% of the latter.

10275 SERUM GASTRIN IN DUODENAL ULCER. PART II. EFFECT OF INSULIN HYPOGLYCAEMIA. (E.) Hansky, J. (Monash U. Dept. Med., Melbourne, Australia), M. G. Korman, D. J. Cowley and J. H. Baron. *Gut* 12(12):959-962, 1971.

Serum gastrin in response to insulin hypoglycemia with and without intragastric neutralization with sodium bicarbonate, and in response to intragastric bicarbonate alone were measured in 4 patients with radiologically-proven duodenal ulcer and 4 normal subjects on 3 separate occasions. In both ulcer patients and normals there was a significant increase in the serum gastrin level in response to insulin hypoglycemia alone, the increase in ulcer patients being significantly greater than that in controls. In response to bicarbonate alone, the serum gastrin level rose significantly in patients of both groups; the rise above basal levels with acid neutralization was not significantly different in the 2 groups. In response to insulin hypoglycemia with bicarbonate, patients with ulcers and normal patients showed significant increases in the serum gastrin level with the increase in the ulcer group again being significantly greater than that in the normal; however, the increase was about 3 times that seen without acid neutralization. The data suggest an increase in the rate of gastrin production in response to vagal stimulation in duodenal ulcer and indicate a specific role of concomitant acid secretion on vagally-stimulated gastrin.

10276 DOES AMYLOPECTIN SULFATE WORK IN DUODENAL ULCER OR NOT? (E.) Littman, A. (VA Hosp., Hines, Ill.). *Gastroenterology* 62(1):141-142, 1972.

Two contradicting studies on the effects of amylopectin sulfate on duodenal ulcer were compared and contrasted. Although dosage regimens were comparable, the patient populations were different. In the Sun-Ryan trial (beneficial effect), patients entered only after healing with conventional therapy had been shown by X-ray, 8-10 weeks after demonstration of the duodenal niche, and there were presumably no symptoms. Cockling's (no effect) patients began treatment within 2 weeks of barium examination, but their freedom from symptoms was not known. Definitions of recurrence also differed. Sun and Ryan defined recurrence in such a way as to imply that symptoms attributable to ulcer were absent in the interim; this is true in most ulcer patients. Cockling speaks of exacerbation rather than recurrence, as a period of increased ulcer pain including at least 7 consecutive days when pain occurred daily followed by a remission. His definition implies, unrightly so, that pain caused by ulcer continues while under treatment. Unless or until duodenoscopic examination or some other method proves practical for judging the healing of duodenal ulcer, appraisal or symptomatic response seems to be the only method.

10277 A TRIAL OF AMYLOPECTIN SULFATE (SN-263) AND PROPANTHELINE BROMIDE IN THE LONG TERM TREATMENT OF CHRONIC DUODENAL ULCER. (E.) Cocking, J. B. (Roy. Infirm., Sheffield, England). *Gastroenterology* 62(1):6-10, 1972.

Subjects consisted of 61 patients with at least a 2-yr history of symptoms of duodenal ulcer disease, confirmed by radiographic examination, and without other clinical disease. During the 48-week period of this study, subjects received amylopectin sulfate (SN-263; 500 mg at 3-hr intervals, six times daily) and/or propantheline (15 mg, one tablet p.o. 3 times during the day and 2 tablets at night) or their respective placebos. Subjects were asked to lead normal lives, stop smoking, and, when necessary, unrestricted antacids, sedation and a gastric diet were prescribed. At the end of 48 weeks, neither agent alone nor in combination had caused any significant symptomatic or radiographic improvement in comparison with controls (placebo of both agents 3 on active amylopectin and 1 on double placebo). During the trial, 4 were withdrawn, 2 because of heartburn and 2 with severe pain necessitating gastric surgery. During the 6-month period following this trial, 9 required surgery for severe pain (4 on active amylopectin, 1 on double placebo). In terms of exacerbations per week, those on active therapy fared worse than those on placebo. Side effects consisted of diarrhea in 1 patient. A small hematemesis and melena in 1 patient necessitated no change in treatment.

10278 STUDIES ON GASTROINTESTINAL HORMONES VI. ANTI-SECRETORY AND ANTI-ULCEROGENIC ACTIVITIES OF A SUBSTANCE EXTRACTED FROM THE MUCOSA OF STOMACH OF WHALE. (Jap.) Tachibana, K. (Nissui Pharm. Co., Tokyo), H. Kabeno and Y. Kobayashi. *Nippon Yakurigaku Zasshi (Folia Pharmacol. Jap.)* 67(3):274-290, 1971.

A gastric glycopeptide, isolated from the mucosa of the third stomach of the finback whale (Balaenoptera physalis L.), showed gastric antisecretory and anti-ulcerogenic activity when injected i.v. into pylorus-ligated rats. The secretion of gastric acid was decreased. The inhibitory dose (0.14-0.36 mg/kg) antagonized the pH-decreasing effects of the stimulants, acetylcholine chloride, histamine 2HCl and tetragastrin in rats in which the stomach was perfused with 0.1 ml NaOH at pH 8.5. The glycopeptide antagonized the gastric acid-stimulating effects of histamine 2HCl and tetragastrin in dogs with Heidenhain pouches. Ulcerogenic changes were induced in the stomachs of rats by ligating the pylorus, by s.c. injection of 5-hydroxytryptamine, by i.v. injection of reserpine and histamine, by starving the animals, or by s.c. injections of prednisolone and acetic acid. I.V. injections of the glycopeptide in these animals inhibited the ulcerogenic changes in the stomach.

10279 THE EFFECTS OF ANTI-ULCER AGENTS ON INDOMETHACIN-INDUCED GASTRIC ULCERATION IN THE RAT. (E.) Lee, Y. H. (G. D. Searle Co., Chicago, Ill.), K. W. Mollison and W. D. Cheng. *Arch. Int. Pharmacodyn. Ther.* 192(2):370-377, 1971.

A dose of 15 mg/kg (i.p.) of indomethacin-induced ulcers in nearly 100% of the rats and was chosen in all experiments. At this dose, indomethacin had no significant effect on gastric juice volume, acid concentration or total acid output in the pylorus-ligated rat. Bilateral vagotomy completely inhibited the ulcer inducing effect of indomethacin and indicated that the vagus nerve was important in the production of gastric ulcers by indomethacin. Both propantheline (an anticholinergic) and SC-15396 (an anticholinergic antisecretory compound) were effective in reducing the number of rats with ulcers and the average number of ulcers per rat. Propantheline completely inhibited ulceration at a dose of 20 mg/rat which again indicated the important role of the vagus in the production of ulcers by indomethacin. SC-15396 completely inhibited ulceration at a dose of 100 mg/rat, whereas sodium amylosulfate was inactive at doses up to 200 mg/rat. These results question the "mucus" hypothesis for indomethacin-induced ulcers and seemingly implicates the vagus nerve as the possible causative agent.

10280 MEASURING THE RESISTANCE OF THE PROTECTIVE MUCUS BARRIER IN THE STOMACH: A MODIFICATION OF SHAY'S TECHNIQUE. (Fr.) Pallarès, J. (Sandoz Co. Med. Biol. Res., Basel, Switzerland) and V. Scarselli. *Arch. Int. Pharmacodyn. Ther.* 192(1):37-47, 1971.

Instillation of 7 ml of gastric juice or a 0.25% HCl solution containing pepsin into the stomachs of fasting rats that had undergone pyloric ligation and vagotomy produced characteristic ulcers throughout the glandular part of the stomach. Female rats were more susceptible to ulcer formation than males. Atropine (5 mg/kg s.c. 30 min before surgery or 5 mg/kg s.c. twice a day for 3 days before surgery) appeared to aggravate rather than to inhibit ulcer formation. When small doses of atropine were administered, the sialic acid concentration of gastric juice increased while the sialic acid content of the gastric mucosa remained unchanged. Deep bleeding ulcers were present in the gastric mucosa 7 hr after administration of phenylbutazone (75 mg/kg i.p.) to these rats; sialic acid values remained unchanged. These findings suggest that atropine acts by breaking the mucus barrier and that phenylbutazone inhibits mucus production. Ulcer formation was inhibited by tripelennamine (30 mg/kg); phenoxybenzamine (40 mg/kg intraduodenally), α-methyldopa (40 mg/kg p.o.), promethazine (40 mg/kg s.c.), and propantheline bromide (20 mg/kg s.c.) had no effect on ulcer formation or on sialic acid contents.

10281 POLYPOID REPARATIVE MUCOSAL PROLIFERATION AT THE SITE OF A HEALED GASTRIC ULCER: SEQUENTIAL GASTROSCOPIC, RADIOLOGICAL, AND HISTOLOGICAL OBSERVATIONS. (E.) Mori, K., H. Shinya and W. I. Wolff (Beth Israel Med. Ctr., New York, N. Y.). *Gastroenterology* 61(4, Pt. 1): 523-529, 1971.

An unusual example of polypoid mucosal proliferation at the site of healing of a bleeding gastric ulcer was observed during a follow-up examination of a gastric ulcer in a 55-yr-old man. Grossly the mass measured 0.8 cm in its greatest diameter. Microscopically the polyp was composed of gastric pits and tubular gastric glands. The gastric pits, which constituted the major portion of the polyp, revealed increased depth and diameter with occasional saccular dilation. The gastric glands were identical with those in the surrounding gastric mucosa, not only in cytologic appearance but also in size, shape, and number. The height of the lining epithelium was markedly increased but the nuclei were uniformly located adjacent to the basement membrane and no cytological irregularities were found in these epithelial cells. Thus, the polypoid configuration of the lesion was produced mainly by proliferation of the gastric pits and the surface epithelium.

10282 ON THE EFFECT OF SELECTIVE PROXIMAL VAGOTOMY ON THE PARIETAL CELLS IN DUODENAL ULCERS. (E.) Holle, G. (Munich U. Surg. Polyclin., Germany), A. Schauer and K. Fellner. *Chir. Gastroenterol.* 5(3):310-317, 1971.

After selective proximal vagotomy and pyloroplasty in cases of duodenal ulcers the decrease in basal secretion led to an examination of the fundic mucosa morphologically and histochemically. From endoscopically produced pre- and postoperative biopsies on 85 patients suffering from duodenal ulcers, 20 cases were selected. The chief and parietal cells were counted in areas of from 5000-7000 chief cells and an index established for the parietal cells. An average decrease of

36% in the density of the parietal cells was noted in the postoperative period. The distribution of the parietal cells prior to surgery was 60% in the upper third as compared to 52% after surgery. In individual regions of the gland the parietal cells decreased after surgery by 44% in the upper region, by 22% in the medial region, and by 31% in the lower region. The succinate dehydrogenase activity of the parietal cells decreased on the average 18% as determined histochemically and by absorption photometry. The decrease in these 2 parameters parallels a postoperative decrease in acid secretion.

10283 VARIATIONS IN SECRETION DURING GASTRIC RESECTION FOR DUODENAL ULCER. (E.) Grassi, G. (St. Giovanni Hosp., Rome), C. Orecchia, B. Sbuelz, I. Cantarelli and G. B. Grassi, Jr. *Chir. Gastroenterol.* 5(3):318-324, 1971.

Forty patients with duodenal ulcers ranging in age from 32-55 yr, 36 men and 4 women, were tested for gastric secretion during operation by means of a pH meter. Stimulation by slow infusion was applied in 20 cases with pentagastrin and in 20 cases with histamine. Of the 40 patients, 10 underwent gastric resection, 15 typical antrectomy and 15 mucosal antrectomy. In the 10 patients who underwent gastric resection, the exploratory electrode gave a pH value of 3.6 over the surface stroma, near the mucosa of the fundus the pH decreased to 2.3. In the other 30 patients the area between the gastric body and antrum pH was 3.6, at the fundus values were 2.2 with abrupt variations by moving the electrode as little as 1 cm. These acid values were found with pentagastrin and histamine stimulation. After vagotomy and careful cleansing of the mucosa, pH values of 6.4 were obtained which did not fluctuate despite continued stimulation with histamine and pentagastrin. These results confirm that after removal of the antral area the presence of acidity in the fundus is attributed to the number of parietal cells and the fundamental role of the vagus on the glandular mass in relation to stimuli.

10284 CLINICAL EXPERIENCE WITH ISOPERISTALTIC INTERPOSITION OF A JEJUNAL SEGMENT FOR THE INCAPACITATING DUMPING SYNDROME. (E.) Fenger, H. J. (Natl. Hosp., Copenhagen), E. Gudmand-Høyer, H. E. Kallehauge and M. Andreassen. *Ann. Surg.* 175(2):274-281, 1971.

Thirty-one patients with incapacitating dumping syndrome of at least 1 yr duration had reconstructional surgery consisting of an isoperistaltic gastroduodenal interposition of 10-15 cm of jejunal segment and abdominal vagotomy, when this had not been performed. Operative lethality was nil and 30 of the patients were followed from 13-71 months. Six patients were cured, 5 have improved and 19 reported unsatisfactory results. The primary lesion in 21 patients was a duodenal ulcer, in 7 patients a gastric ulcer, in 1 case a prepyloric ulcer and in 2 cases no ulcer. The previous surgery was a Billroth I resection in 12 cases, 4 of whom had abdominal vagotomy, and a Billroth II resection in 19 cases, 3 with abdominal vagotomy. Only patients who had undergone a Billroth II procedure were cured (9 of 18). None of the patients with Billroth I resections were cured and only 2 of 12 had improved. Isoperistaltic jejunal interposition has been abandoned by the authors in the treatment of pure, severe dumping syndrome except where severe dumping is associated with bilious vomiting. It is believed that the 6 cured patients had "dumping like" symptoms related to the afferent loop.

10285 GASTRIC MOTILITY IN DUODENAL ULCER PATIENTS. (Ger.) Schmid, E. (Dist. Hosp., Goppingen, Germany) and G. Hintz. *Z. Gastroenterol.* 9(5):367-370 & XVII, 1971.

No significant differences could be demonstrated between 39 healthy volunteers and 21 patients with nonhemorrhagic duodenal ulcer, as concerned the absolute number of Type II or Type III gastric contractions occurring during a 150-min observation period with intragastric instillation of 20 ml placebo solution at the end of the first 30 min. However, as compared to the pre-instillation frequency per 30 min, the healthy controls showed a progressive, significant increase of the number of Type II contractions per 30-min interval during the first 2 post-instillation intervals, followed by a progressive, significant decrease during the 2 intervals which followed. This phenomenon was not exhibited by the ulcer patients.

10286 DIFFICULTIES IN TREATMENT OF LUNG TUBERCULOSIS IN PATIENTS WITH COEXISTENT PEPTIC ULCER. (Pol.) Stanek, S. (Prov. Hosp., Tuszyn, Poland) and D. Stanek. *Wiad. Lek.* 24(21):1877-1883, 1971.

10287 ADRENOCORTICAL HORMONE DISTURBANCES AND GASTRIC AND DUODENAL ULCER. (Pol.) Plotnicki, T. (KW MO Hosp., Cracow, Poland) and B. Plotnicki. *Wiad. Lek.* 24(16):1533-1535, 1971.

10288 THE DYNAMICS OF HOSPITAL STAY OF ULCER PATIENTS. (Ger.) Cremerius, J. (Justus Liebig U., Polyclin., Giessen, Germany). *Z. Psychosom. Med. Psychoanal.* 17(3-4):282-293, 1971.

10289 CHANGES IN THE HEPATIC RHEOGRAM IN GASTRODUODENAL ULCER AND CHRONIC HYPERACIDIC GASTRITIS. (Rus.) Epshtein, E. E. and R. D. Rogova. *Zdravookhr. Beloruss.* 17(2):26-29, 1971.

10290 EXCRETION OF SEX HORMONES IN PATIENTS WITH DUODENAL ULCER. (Rus.) Kochkarev, V. M. *Ter. Arkh.* 43(10):31-35, 1971.

10291 PERSONALITY FEATURES AND THE PSYCHOSOMATIC INTERRELATIONSHIPS IN PATIENTS WITH THE GASTRIC ULCERATIVE DISEASE (DUODENUM) AND CHRONIC NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Belov, V. P. (2nd Med. Inst., Moskow). *Zh. Neuropatol. Psikhiatr. Korsakov.* 71(9):1385-1390, 1071.

10292 EXPERIENCE OF THE THERAPEUTIC USE OF THE ANABOLIC STEROID METANDIENONE IN COMBINATION WITH QUATERON IN EXACERBATIONS OF PEPTIC ULCER. (Rus.) Vakhrushev, I. M. *Ter. Arkh.* 43(10):26-30, 1971.

10293 GASTRIC AND DUODENAL ULCERS: ARE THEY TWO DIFFERENT DISEASES? (Por.) Bettarello, A. (U. Sao Paulo Sch. Med., Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 26(4):153-158, 1971.

10294 THE LONG TERM RESULTS OF SELECTIVE SURGERY OF GASTRODUODENAL ULCER. (E.) Toader, C. (Inst. Med., Cluj, Rumania) and I. Toader. *Rev. Med. Chir. Iasi* 75(2):371-378, 1971.

10295 CLINICAL AND THERAPEUTIC ASPECTS OF GASTRODUODENAL ULCER HEMORRHAGE IN THE AGED. (Rum.) Lazar, C. (Inst. Med., Iasi, Rumania), C. Dolinescu and M. Chifan. *Rev. Med. Chir. Iasi* 75(2):379-384, 1971.

10296 CLINICAL VALUE OF GASTRIC SECRETORY TEST. (Sw.) Dotevall, G. (Sahlgrenska Hosp., Goteborg, Sweden) and A. Walan. *Nord. Med.* 86(45): 1293-1297, 1971.

10297 CURATIVE EFFECTS OF PLP INJECTION (HUMAN PLACENTA PREPARATION) ON EXPERIMENTAL ULCER PRODUCED BY THERMAL INJURY. (Jap.) Sakae, K. (Kyoto Gen. Med. Chem. Lab., Japan), I. Suzuki and A. Matsumura. *Pharmacometrics (Tokyo)* 5(1): 159-167, 1971.

10298 PEPTIC ULCER IN BRONCHIAL ASTHMA AND OTHER CHRONIC RESPIRATORY DISEASES. (Pol.) Kaszewska Jablonska, I. (Med. Acad 1st Clin. Intern. Dis., Gdansk, Poland), K. Szulczynska and J. Przezdziak. *Przegl. Lek.* 28(8):518-521, 1971.

10299 GASTRIC OR DUODENAL ULCER AND THE MORE IMPORTANT INTERNAL AND ENVIRONMENTAL FACTORS. (Pol.) Bojanowicz, K. (Med. Acad. 1st Clin. Intern. Dis., Lodz, Poland), A. Zubowski, Z. Durasiewicz and N. Szeszenia. *Przegl. Lek.* 27(7):457-460, 1971.

10300 DUODENAL ULCER: ITS SURGICAL TREATMENT. (Sp.) Piquinela, J. A. *Prensa Med. Argent.* 58(29):1484-1489, 1971.

10301 THE CARBOHYDRATE METABOLISM AND GLYCOGENETIC FUNCTION OF THE LIVER AFTER GASTRECTOMY FOR PEPTIC ULCER. (Rus.) Margulis, F. B. *Khirurgiia (Mosk.)* 47(9):21-24, 1971.

10302 PATHOGENESIS, CLINICAL PICTURE AND TREATMENT OF PEPTIC ULCER. (Rus.) Ananiev, V. G., A. S. Gadzhiev, V. P. Spivak and G. E. Tovstolitkin. *Khirurgiia (Mosk.)* 47(9): 16-21, 1971.

10303 VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER. (Rus.) Sitenko, V. M. and A. A. Kurigin. *Khirurgiia (Mosk.)* 47(9):9-16, 1971.

10304 SOME MOOT QUESTIONS IN SURGERY OF PEPTIC ULCER. (Rus.) Maiat, V. S. and I. M. Pantsirev. *Khirurgiia (Mosk.)* 47(9): 3-9, 1971.

10305 PEPTIC ULCER. ETIOPATHOGENESIS AND THERAPY. (Por.) Noleto, P. A. (State U. Guanabara Dept. Med., Rio de Janeiro, Brazil). *Rev. Bras. Med.* 28(5):191-194, 1971.

10306 COAGULATING AND ANTICOAGULATING SYSTEMS OF THE BLOOD IN PATIENTS WITH ULCERS COMPLICATED BY HEMORRHAGE. (Rus.) Chistiakov, V. A. (Clin. Hosp., Kiev, USSR). *Klin. Khir.* 51(9):31-35, 1971.

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10308 HISTAMINE METABOLISM IN PATIENTS OPERATED FOR GASTRODUODENAL PEPTIC ULCER. (Rus.) Gramenitskii, A. B. *Khirurgiia (Mosk.)* 47(9):24-28, 1971.

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10313 PATHOGENESIS AND MEDICAL TREATMENT OF PEPTIC ULCER. (It.) Stocchi, F. (Pious Inst., Rome). *Policlinico [Prat.]* 78(20): 827-849, 1971.

10314 CLINICAL TRIAL OF A PEPSIN INACTIVATOR IN THE TREATMENT OF PEPTIC ULCER. A PRELIMINARY REPORT. (E.) Viranuvatti, V. (Siriraj Hosp., Bangkok, Thailand), O. Chearanai and C. Kalayasiri. *J. Med. Assoc. Thai.* 54(9): 625-629, 1971.

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10319 CRANIOCEREBRAL TRAUMA, WITH SPECIAL REFERENCE TO STRESS ULCER. (Ger.) Kindler, M. (Reg. Hosp., Gorlitz, Germany) and R. Schroth. *Dtsch. Gesundheitsw.* 26(30):1414-1416, 1971.

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10323 PRESENT TRENDS IN THE TREATMENT OF ULCERS ACCORDING TO THE CASE RECORDS OF THE FIRST SURGICAL CLINIC, CLUJ. (Rum.) Nana, A. (Inst. Med. Pharm., Cluj, Rumania), C. Mircioiu and M. Nana. *Chirurgia (Bucur.)* 20(8): 673-686, 1971.

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10326 THE DELAYED INSULIN TEST AND RECURRENT DUODENAL ULCERATION. (E.) Watkin, D. F. L. (Roy. Infirm., Sheffield, England). *Br. J. Surg.* 58(10):775-780, 1971.

10327 PREDICTION OF SUCCESS OR FAILURE OF GASTRIC SURGERY. (E.) McColl, I. (St. Bartholomew's Hosp., London), J. E. Drinkwater, I. Hulme Moir and S. P. B. Donnan. *Br. J. Surg.* 58(10):768-771, 1971.

10328 SHOULD THE GASTRIC ANTRUM BE VAGALLY DENERVATED IF IT IS WELL DRAINED AND IN THE ACID STREAM? (E.) Johnston, D. (Gen. Infirm., Leeds, England), C. S. Humphrey, R. B. Smith and A. R. Wilkinson. *Br. J. Surg.* 58(10):725-731, 1971.

10329 VAGOTOMY FOR GASTRIC ULCER COMBINED WITH DUODENAL ULCER. (E.) Douglas, M. C. (Roy. Infirm., Sheffield, England) and H. L. Duthie. *Br. J. Surg.* 58(10):721-724, 1971.

See also numbers: 9895, 9925, 10787, 10816, 10843

10330 "PSEUDOTUMOR EFFECT" IN HYPOTONIC DUODENOGRAPHY. REPORT OF 2 CASES. (E.) Kikkawa, K. (Guthrie Clin., Sayre, Pa.) and J. T. Littleton. *Radiology* 102(3):527-530, 1972.

A 44-yr-old white male presented with a weight loss of 30 pounds over 4 yr, anorexia, nausea, postprandial epigastric fullness and vomiting upon eating rich foods. Laboratory studies were normal and an upper gastrointestinal series showed a long, stenosing lesion in the first and second portions of the duodenum, while the small intestine study was normal. Hypotonic duodenography showed the contour of this segment to be fine and irregular, and small contour defects were also present along the medial aspect of the C-loop. The diagnosis of an infiltrative neoplastic lesion encircling the duodenum was not borne out as much as surgery revealed granulomatous enteritis of the proximal duodenum. A 54-yr-old male presented with indigestion and vomiting of several days duration, crampy epigastric pain and tarry stools. The standard upper gastrointestinal study revealed a possible contour defect along the lateral aspect of the apex of the duodenal bulb and the adjacent mucosal folds were slightly prominent. Hypotonic duodenography revealed a 3 X 2 cm intramural mass containing an ulcer crater, with a presumptive diagnosis of an ulcerating tumor metastatic to the duodenal wall or an intramural benign tumor such as a leiomyoma associated with ulceration. Laparotomy revealed a large peptic duodenal ulcer and a vagotomy and pyloroplasty were performed.

10331 HEMODYNAMIC EFFECTS OF SUPERIOR MESENTERIC ARTERY OCCLUSION: A COMPARISON IN ANESTHETIZED AND UNANESTHETIZED DOGS. (E.) Wilson, J. M. (Cornell U. Med. Ctr., New York, N. Y.) and P. A. Ebert. *Ann. Surg.* 175(2):214-222, 1972.

The effects of acute superior mesenteric artery occlusion on myocardial function and on isolated rabbit cardiac muscle was studied in unanesthetized and anesthetized dogs. The dogs were divided into 6 groups. Group 1 of 12 dogs had superior mesenteric occlusion for 6 hr; Group 2 had occlusion for 3 hours and long term follow-up; Group 3 were controls; Group 4 were anesthetized with pentobarbital sodium and had occlusion; Group 5 received only the anesthetic. Morphine sulfate was the only agent used for the unanesthetized dogs. After 6 hr of occlusion in the unanesthetized animals there were minimal hemodynamic changes in the dog and no decrease in contraction of isolated muscle strips. A decrease in cardiac output and mean aortic pressure was noted in the anesthetized animals and their serum samples decreased contractility of isolated muscle strips. The effect of the serum on the muscle strips remained after 48 hr of dialysis of the serum. This suggests that circulatory myocardial depressant factors may be related to the anesthetic agent or to a metabolic byproduct.

10332 MECKEL'S DIVERTICULUM AS THE CAUSE OF SEVERE ABDOMINAL DISEASE. (Ger.) Böttcher, R. F. H. (Karl Marx U. Surg. Clin., Leipzig, Germany), H. Bellmann and H. Graetz. *Dtsch. Gesundheitsw.* 26(35):1667-1669, 1971.

In a 20-yr period 24 patients underwent intestinal resection for Meckel's diverticulum. In 8 patients the diagnosis was made by chance at appendectomy, 8 patients had clinical symptoms of this malformation, and the remaining 8 patients presented with complications. These consisted of perforation of the diverticulum (4), ileus caused by strangulation (2) or intussusception (1), and acute diverticulitis with nonperforative peritonitis (1); 5 patients presented with peritonitis. Histological examination of the diverticulum in these 24 cases showed that 9 patients had normal intestinal mucosa, 7 had chronic inflammation of the mucosa, and 2 had acute inflammation of the mucosa. Ectopic gastric mucosa was found in the diverticulum in 3 patients; ectopic pancreatic tissue was also present in 1 of these 3. Ulcers of the gastric mucosa, which were found in 2 cases, had perforated in 1. Meckel's diverticulum was not diagnosed before surgery in any of these 24 patients. Because of the high incidence of complications, it is recommended that Meckel's diverticulum be resected, even if the patient is asymptomatic.

10333 GASTROINTESTINAL BLEEDING DUE TO BLUE RUBBER BLEB NEVUS SYNDROME. A CASE DIAGNOSED BY ANGIOGRAPHY. (E.) Baker, A. K. (Tufts-New England Med. Ctr., Boston, Mass.), P. C. Kahn, S. C. Binder and J. F. Patterson. *Gastroenterology* 61(4, Pt. 1):530-534, 1971.

A 75-yr-old female patient with blue rubber bleb nevus syndrome and a vascular lesion of the gastrointestinal tract which was diagnosed by angiography is presented. The patient had had melena for 12 yr. Using celiac and selective superior and inferior mesenteric artery angiography, an intestinal arteriovenous (A-V) malformation was seen in the distribution of the ileocolic artery. Previous to this, barium studies were normal and surgical abdominal exploration was negative. At laparotomy the vascular structure shown on angiogram could not be felt or demonstrated by transillumination; however, all the intestine within the distribution of the ileocolic artery was resected. A cavernous hemangioma was demonstrated 12 cm from the ileocecal valve. Fourteen months after surgery she again developed melena but the bleeding stopped spontaneously. This episode may have been due to an intestinal A-V malformation unrecognized on the earlier arteriogram.

10334 GRAFT VERSUS HOST DISEASE. RADIOGRAPHIC FINDINGS IN A PATIENT WITH SEVERE INTESTINAL INVOLVEMENT. (E.) Shimkin, P. M.

(NCI, Bethesda, Md.), R. A. DeLellis, R. L. Carolla and M. A. Weinstein. *Radiology* 102(3): 623-624, 1972.

A single case is presented of a 6-yr-old boy with acute leukemia who had been treated with chemotherapy for 3 yr with development of increasing resistance to these agents. Fourteen days after his last remission he was prepared with high-dose cyclophosphamide immunosuppression and received a bone-marrow transplant from his HL-A-identical, MLC-compatible brother. His post-transplant course was uneventful until day 13 when he developed nasal congestion, nausea, vomiting, severe abdominal pain, diarrhea, melena, hepatomegaly and dermatitis. Serologic evidence suggested that the graft had taken. He deteriorated for 5 weeks, during which time he developed cachexia, fever, episodes of hypotension, lymphopenia and thrombocytopenia. His diarrhea (more than 2 liters/day) was associated with an adynamic ileus, hypokalemia and malabsorption, while radiographic studies showed loss of small-intestine folds. He died of a fulminating Aspergillus fumigatus pneumonia on the seventieth day after transplant. At autopsy there was evidence of graft-versus-host disease, with no evidence of recurrent leukemia. The radiographic findings were similar to those seen in some cases of mesenteric vascular compromise, vasculitis and intramural hemorrhage, but showed no progression over a 1-month period, which would be uncharacteristic of these other entities.

10335 HISTAMINE AND SEROTONIN METABOLISM FOLLOWING MASSIVE SMALL BOWEL RESECTION. (E.) Fischer, J. E. (Massachusetts Gen. Hosp., Boston), S. H. Snyder, J. H. James and R. Baldessarini. *Ann. Surg.* 175(2):260-267, 1972.

Gastric acid hypersecretion following resection of the major portion of the small intestine prompted this study in mature female rats. Fifty and 75% resections were carried out leaving equidistant lengths of intestine from pylorus to ileocecal valve. Sham-operated animals served as controls. Stools were generally diarrheic for several weeks after the operation but had solidified when the animals were sacrificed at 8 weeks. Determinations of histamine, serotonin, 5-hydroxytryptophan decarboxylase, histamine methyl transferase, diamine oxidase, histidine decarboxylase were performed on the rats and results were correlated with the tests for gastric acid secretion. Three weeks after massive small intestine resection gastric acid secretion was increased and appeared greater in the rats with 75% resection but diminished following administration of the histidine decarboxylase inhibitor NSD-1055 (4-bromo-3-hydroxylbenzoxamine). No differences could be detected between controls and resected animals for histamine, histidine decarboxylase, serotonin and all other assayed enzymes except for diamine oxidase which was diminished but is normally present in superabundance and is unlikely to be functionally significant. The etiology of the gastric acid hypersecretion remains unknown.

10336 QUANTITATION OF INTRAEPITHELIAL LYMPHOCYTES IN HUMAN JEJUNUM. (E.) Ferguson, A. (Western Infirm., Glasgow, Scotland) and D. Murray. *Gut* 12(12):988-994, 1971.

Secretions from 200 routinely obtained jejunal biopsies were examined and villous intra-epithelial lymphocytes were counted, a normal range of values for the degree of lymphocyte infiltration was established, and then the numbers of intraepithelial lymphocytes were evaluated in various disease states. From analysis of the results in 160 jejunal biopsies from non-celiac patients the range of normal values was established as 6-40 intraepithelial lymphocytes per 100 epithelial cells. Intra-epithelial lymphocyte counts in untreated celiac patients were significantly higher than in controls, but were significantly lower than this, but still significantly higher than controls in patients on a gluten-free diet. The lymphocyte count bore no relation to the clinical state of these patients at time of biopsy. Of 19 patients with various autoimmune diseases only 3 had elevated intra-epithelial lymphocyte counts. Counts were also usually normal in ulcerative colitis and Crohn's disease. In four patients, elevated counts were not associated with any other histologic changes yet they exhibited prolonged and incapacitating gastrointestinal symptoms.

10337 CLINICAL AND RADIOLOGIC EVALUATION OF PATIENTS WITH X-RAY INDICATIONS OF INFLAMMATION OF THE TERMINAL ILEUM. (Sp.) Lopez-Calderon Barreda, M. (Hermanos Aznar Out-Patient Clin., Madrid). *Rev. Esp. Enferm Apar. Dig.* 35(8):899-924, 1971.

Careful clinical and radiologic studies of 106 patients with X-ray evidence of pathology of the terminal ileum resulted in the following diagnoses: nonspecific inflammatory lesions, 41 of 106; pseudotubercular ileitis, 34 of 106; peritonitis with adhesions to the terminal ileum, 15 of 106; tubercular ileitis, 14 of 106; Crohn's disease, 2 of 106. Each subgroup is described in detail with respect to age distribution, duration of illness, presenting symptoms and problems of differential diagnosis.

10338 LATE RESULTS OF SIDE TO SIDE CHOLEDOCHODUODENOSTOMY AND OF TRANSDUODENAL SPHINCTEROTOMY FOR BENIGN DISORDERS. A TWENTY YEAR COMPARATIVE STUDY. (E.) Stuart, M. (Cleveland Clin. Found., Ohio) and S. O. Hoerr. *Am. J. Surg.* 123(1):67-72, 1972.

The incidence of early postoperative complication including pancreatitis was higher in transduodenal sphincterotomy patients than in choledochoduodenostomy group. A total of 85 patients were followed in a range of 6 months-20 yr. Eighty-one percent of patients who underwent side-to-side choledochoduodenostomy were completely well or had minor complaints as compared to 70% who underwent transduodenal sphincterotomy. Only 1 with the former procedure required reoperation compared to 7 patients with the latter procedure, 4 for pancreatitis and 3 for retained or recurrent calculi. Transduodenal sphincterotomy should be limited, in its use for biliary tract problems, to patients in whom there is demonstrable stenosis of the Sphincter of Oddi and a common bile duct of normal caliber or to patients requiring the transduodenal removal of a stone impacted in the ampulla of Vater. Side-to-side choledochoduodenostomy is indicated where improved internal drainage of bile is desirable and when the common bile duct is enlarged and thick-walled.

10339 THE EFFECT OF PORCINE DUODENAL MUCOSA EXTRACT UPON ENZYME RELEASE FROM PANCREATIC ZYMOGEN GRANULES IN VITRO. (E.) Adelson, J. W. (U. Bern Pediatr. Clin., Switzerland) and A. Ehrlich. *Endocrinology* 90(1):60-66, 1972.

The presence of biologically active substances in duodenal mucosal extracts was indicated by both turbidity loss and release of amylase and trypsin-activatable protease from suspensions of isolated rat pancreatic zymogen granules. The release of amylase by duodenal mucosal extracts was proportional to both the amount of extract added and to the amount of zymogen granules present. The loss of turbidity was not due to the presence of bile salts used in the preparation of the extracts or to the secretion or cholecystokinin-pancreozymin contained in the extract. Sephadex G-25 fractionation of the extract led to resolution of Factors A and B, both of which caused amylase release. Factor A, of higher molecular weight, caused the turbidity loss. Both factors were insensitive to boiling for 20 min, were active at 10^{-6} M or less, were inactivated by trypsin treatment and were peptides of molecular weight in excess of 2500 daltons.

10340 UNUSUAL FORMS OF VOLVULUS AFTER THE NEONATAL PERIOD. (E.) Pochaczevsky, R. (Greenpoint Hosp. Affil., Brooklyn, N. Y.), H. Ratner, J. C. Leonidas, P. Naysan and F. Feraru. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 114(2): 390-393, 1972.

Two unusual cases of midgut volvulus which occurred in children 5.5 yr and 10 months of age with roentgenographic findings which varied from those commonly seen in the neonatal period are presented. In both cases the roentgenograms reflected the existence of a low mechanical intestinal obstruction. In the 5.5-yr-old patient, in whom a proximal large intestine obstruction was apparent, only a lack of fixation of the cecum and ascending colon was present. In the 10-month-old patient in whom a low small intestine obstruction was noted, the volvulus affected mainly the ileum. In neither patient were the "typical" roentgen findings of a high duodenal obstruction observed, i.e. the "double bubble" sign, consisting of a dilated stomach and proximal duodenum. Thus, in some cases of volvulus, where lack of fixation of the mesentery is the sole abnormality, typical roentgen findings may not be present.

10341 ROENTGENOGRAPHIC EVIDENCE OF GANGRENOUS BOWEL IN MIDGUT VOLVULUS WITH OBSERVATIONS IN EXPERIMENTAL VOLVULUS. (E.) Frye, T. R. (Child. Hosp., Columbus, Ohio), C. L. Mah and M. Schiller. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 114(2):394-401, 1972.

The records of 36 cases of midgut volvulus which were confirmed by roentgenographic studies and/or surgery were reviewed in an attempt to explain the clinical findings; and 23 Sprague-Dawley rats underwent roentgenographic examination after surgically-created volvulus. Three basic patterns were noted on the abdominal roentgenograms of these patients: a high small intestine obstruction (most frequent), a normal abdomen or "nonspecific" pattern, and a low bowel obstruction. There was a striking correlation between the last pattern and gangrenous bowel in midgut volvulus (5 of 7 patients with this pattern). None of the patients with viable intestine and midgut volvulus showed the findings of a low obstruction with multiple distended loops of bowel. In rats blocking the venous return of the obstructed closed intestinal loop caused the retention of swallowed gas in the loop. Thus, the appearance of low bowel obstruction may be a valuable adjunctive diagnostic sign which will permit the earlier diagnosis and treatment of bowel gangrene.

10342 MORPHOLOGICAL AND FUNCTIONAL RESPONSE OF HUMAN SMALL INTESTINE TO IONIZING IRRADIATION. (E.) Tarpila, S. (U. Helsinki Gastroenterol. Unit). *Scand. J. Gastroenterol.* 6(Suppl. 12):1-52, 1971.

Small intestine biopsies were performed in 34 patients, with no tumor of the gastrointestinal tract, and who were receiving radiation therapy to the pancreas, retroperitoneal glands, lumbar vertebrae or ovaries. Biopsy specimens were obtained before and immediately after irradiation; further specimens were taken 1-5 months after the end of radiotherapy in 4 who showed marked histologic changes at the end of irradiation. The most marked histologic changes were seen in those who received more than 3000 rads at the biopsy site, and either partial or subtotal villous atrophy and increased round cell infiltration were seen in 9 of these 10 patients. Of 14 who received 1000-3000 rads at the biopsy site, only 4 showed villous changes. Villous changes were seen in only 1 of 10 who received less than 1000 rads to the biopsy site and in none of 7 controls (who received 3000-6000 rads to the chest or head). Normal histology was seen in the 4 examined 1-5 months after therapy. There was no significant difference between post- and pre-irradiation mitotic counts. Electron microscopic changes were greatest in the cases of most marked light microscopic changes and consisted of reduction in size and number of microvilli, enlarged epithelial intercellular spaces, widespread vacuolization and increase in the number of lysosomes, swelling of mitochondria with fragmentation of cristae, nuclear enlargement, thickening of the basement membrane and increased number of polyribosomes. Reduced levels of microvillous enzymes were noted (maltase, sucrase, palatinase, lactase and cellobiase) but not of lysosomal enzymes (BN-galactosidase and BN-glucosidase). Clinical levels of malabsorption were revealed by the xylose tolerance test and fecal fat determinations.

10343 FACTORS CORRELATING WITH A SUCCESSFUL OUTCOME FOLLOWING EXTENSIVE INTESTINAL RESECTION IN NEWBORN INFANTS. (E.) Wilmore, D. W. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.). *J. Pediatr.* 80(1):88-95, 1972.

Survival following massive intestinal resection in 50 neonates was related to the length of remaining small intestine. All but one infant survived resection which left 38-75 cm of jejunum and ileum, the death resulting from intestinal obstruction. Longer residual segments were necessary if the ileocecal valve was removed, and small bowel resection of more than 85% may jeopardize survival in these patients. Factors which correlated with survival included birth weight (survivors 3.1 kg; nonsurvivors 2.3 kg), successive operative therapy without complications, and lack of associated anomalies. Long-term parenteral nutrition following massive intestinal resection provides essential nutritional support until bowel compensation and enhanced intestinal absorption are achieved.

10344 SELECTIVE DILATION OF THE CONSTRICTED SUPERIOR MESENTERIC ARTERY. (E.) Ulano, H. B., E. Treat, L. L. Shanbour and E. D. Jacobson (U. Texas Med. Sch., Houston). *Gastroenterology* 62(1):39-47, 1972.

The hemodynamic responses of the constricted mesenteric circulation of dogs to intra-arterial infusion of prostaglandin E, (0.1 μg/kg min), isoproterenol (0.5 μg/kg min), glucagon (0.5 μg/kg min) and dopamine (10 μg/kg min) was studied. Persistent hypotension, mesenteric ischemia and arteriolar constriction in the intestinal circulation was produced by removing 30% of the blood volume. Infusion of prostaglandin, glucagon and isoproterenol into the constricted mesenteric artery was followed by dilation of the vessel and restoration of blood flow nearly to control (prehemorrhage) levels with no effect on systemic arterial pressure; however, these effects did not persist after cessation of the infusions. No change was observed in either the caliber or the blood flow of the mesenteric artery during dopamine infusion. The data suggest a possible role for these agents in the treatment of nonocclusive ischemic disease of the gut.

10345 EFFECT OF 9-α-FLUOROHYDROCORTISONE ON THE ILEAL EXCRETA OF ILEOSTOMIZED SUBJECTS. (E.) Kramer, P. (Univ. Hosp., Boston, Mass.) and R. Levitan. *Gastroenterology* 62(2):235-241, 1972.

9-α-Fluorohydrocortisone (2 mg/day, p.o.), administered to 5 subjects with stable ileostomy function who had total colectomies for ulcerative colitis, did not affect the 24-hr excretion of sodium but led to an increase in mean potassium excretion and concentration in the ileal excreta. The mean urinary sodium fell but mean potassium output was unchanged indicating differing renal and small intestinal responses to exogenous oral 9-α-fluorohydrocortisone. In 1 sodium-depleted subject, mean ileal sodium excretion decreased, while the sodium concentration rose during 9-α-fluorohydrocortisone administration. Urine sodium decreased while urine potassium increased, suggesting that exogenous mineralocorticoids in sodium-depleted individuals with ileostomies may be of therapeutic value by aiding them to conserve salt.

10346 COMPLICATIONS OF MECKEL'S DIVERTICULUM. (Ger.) Lynen, F. K. (Rhein Westphalian Tech. Sch., Aachen, Germany). *Z. Allgemein Med.* 47(27):1390-1393, 1971.

10347 THE SURGICAL PATHOLOGY OF MECKEL'S DIVERTICULUM. (Rus.) Riumshin, G. I. *Vestn. Khir.* 107(8):49-52, 1971.

10348 IMPAIRED ABSORPTION OF VITAMIN B_{12} IN ILEITIS. (Pol.) Maj, S. (Inst. Hematol., Warsaw, Poland) and L. Konopka. *Wiad. Lek.* 24(17):1657-1661, 1971.

10349 THE EVACUATION FUNCTION OF THE DUODENUM AFTER A BILLROTH II GASTRECTOMY. (Rus.) Rusanov, A. A. and V. J. Petrov. *Vestn. Khir.* 107(8):25-29, 1971.

10350 A CLINICAL CASE OF INTESTINAL DUPLICATION. (Fr.) Bourbeau, D. (Hotel Dieu, Montreal, Quebec, Canada) and J. M. Moutquin. *Union Med. Can.* 100(8):1581-1583, 1971.

10351 SYMPTOMATOLOGY OF UNCOMPLICATED MECKEL'S DIVERTICULUM. (Ger.) Lynen, F. K. (Rhein Westphalian Tech. Inst., Aachen, Germany). *Actuelle Chir.* 6(3):177-184, 1971.

10352 SIMULTANEOUS OCCURRENCE OF MECKEL'S DIVERTICULUM AND PERITONITIS FIBROSA ENCAPSULANS. (Hun.) Szilagyi, J. (Med. Inst., Budapest) and I. Szanto. *Orv. Hetil.* 112(29): 1718, 1971.

10353 FAILURE TO ISOLATE MYCOPLASMAS FROM UPPER SMALL INTESTINE OF MAN. (E.) Altucci, P. (U. Naples 1st Med. Clin., Italy), G. P. Jori, L. Manguso and G. L. Varone. *Pathol. Microbiol.* 37(3):181-184, 1971.

10354 SHOULD AN ASYMPTOMATIC MECKEL'S DIVERTICULUM BE RESECTED? (Ger.) Schramm, H. (Friedrich Schiller U., Surg. Clin., Jena, Germany) and R. Schiewe. *Zentralbl. Chir.* 96(37): 1265-1270, 1971.

10355 INTESTINAL INTUBATION THROUGH A GASTROSTOMA IN THE TREATMENT OF ACUTE INTESTINAL OBSTRUCTION AND PURULENT PERITONITIS. (Rus.) Dederer, J. M., A. V. Ovchinnikov and V. E. Sudorogin. *Vestn. Khir.* 107(8):10-14, 1971.

10356 NECROTIC DIVERTICULITIS OF THE DUODENUM. (Rus.) Znukovskii, I. M. (Cent. City Hosp., Baranovichi, USSR) and V. F. Kumeisha. *Zdravookhr. Beloruss.* 17(9):73-74, 1971.

10357 ISOLATED RETROPERITONEAL RUPTURE OF THE DUODENUM. (Rus.) Spasiuk, M. I. (Dist. Hosp., Nadvornaya, USSR). *Zdravookhr. Beloruss.* 17(9):74-75, 1971.

10358 THE LOCATION OF HEMORRHAGE IN PEUTZ JEGHERS SYNDROME DETERMINED BY SELECTIVE ANGIOGRAPHY. (Slovene) Satler, J. (Med. Sch., Ljubljana, Yugoslavia), M. Mrak Pogacar, I. Obrez and O. Koncan. *Acta Med. Iugosl.* 25(2): 207-213, 1971.

10359 PRESENTATION OF A CASE OF PEUTZ JEGHERS SYNDROME. (Ger.) Hagemann, H. (Dist. Hosp., Radebeul, Germany). *Zentralbl. Chir.* 96(33):1134-1138, 1971.

10360 NEONATAL ILEUS DUE TO CYSTIC SMALL INTESTINE DUPLICATION. (Ger.) Vinz, H. (Med. Acad., Surg. Clin., Magdeburg, Germany). *Zentralbl. Chir.* 96(36):1256-1259, 1971.

10361 INTESTINAL OBSTRUCTION DUE TO MESENTERIC VASCULAR OCCLUSION. (E.) Mozes, M. (Tel Hashomer Govt. Hosp., Tel Aviv), R. Adar and N. Tsur. *Surg. Gynecol. Obstet.* 133(4):583-587, 1971.

10362 EXPERIMENTAL STUDY OF HETEROTOPIC SMALL INTESTINE HOMOGRAFTS: PRELIMINARY DATA. (Por.) Schmidt Goffi, F. (U. Sao Paulo Sch. Med., Brazil), I. Fujimura and E. M. Castro De Tolosa. *Rev. Paul. Med.* 77(3):57-62, 1971.

10363 CHRONIC PERITONITIC ENCAPSULATION OF THE SMALL INTESTINE DUE TO TUBERCULOSIS WITH PROLONGED HIGH JEJUNAL OBSTRUCTION. (E.) Patterson, J. (Roy. Victoria Hosp., Belfast, Ireland), A. D. Gough, J. S. Logan and J. W. S. Irwin. *Ulster Med. J.* 40(2):111-115, 1971.

10364 REPORT OF A NEW FAMILY WITH PEUTZ JEHGERS SYNDROME. (E.) Olson, R. O. (Univ. Hosp., Omaha, Neb.) and J. A. Rasmussen. *Nebr. State Med. J.* 56(11):428-432, 1971.

10365 THE PEUTZ JEGHERS SYNDROME. COMMENTS ON A CASE, AND ON ITS COURSE OVER 9 YEARS AND ITS PROGNOSIS. (Fr.) Chappuis, J. P. (Edouard Herriot Hosp., Lyon, France), P. Moreau, M. Daudet and M. Crouzet. *Pediatrie* 26(6): 655-658, 1971.

10366 ADENOMATOUS POLYP OF THE JEJUNUM. (It.) Dettori, V. (Pellegrini Hosp., Naples, Italy), R. Dello Russo and D. Meucci. *Rass. Int. Clin. Ter.* 51(13):796-806, 1971.

10367 OSTEODYSTROPHY, RETARDATION AND SUCTION BIOPSY OF THE DUODENAL MUCOSA IN PHENYLKETONURIA. (Ger.) Nitz, I. (Univ. Pediatr. Charite Clin., Berlin), G. Cobet and K. Robbe. *Radiologe* 11(9):305-307, 1971.

10368 CONGENITAL DISTURBANCES IN THE LOCATION OF THE FIRST LOOP OF THE SMALL INTESTINE AS A CAUSE OF OBSTRUCTION IN NEONATES AND INFANTS. (Pol.) Grochowski, J. (Med. Acad. Inst. Pediatr., Cracow, Poland), A. Janik and F. Zontek. *Przegl. Lek.* 27(6):451-453, 1971.

10369 DUODENAL CANCER ASSOCIATED WITH CHOLELITHIASIS. (Rus.) Shain, A. A. and B. N. Babinov. *Khirurgiia (Mosk.)* 47(8): 117-118, 1971.

10370 THE DIAGNOSIS OF MALIGNANT NEOPLASMS OF THE SMALL INTESTINE. (Rus.) Mironova, V. I. *Khirurgiia (Mosk.)* 47(8):68-72, 1971.

10371 THE DIAGNOSIS AND TREATMENT OF MALIGNANT TUMORS OF THE DUODENUM. (Rus.) Makokha, N. S. and I. A. Zikov. *Khirurgiia (Mosk.)* 47(8):29-35, 1971.

10372 TYPHOIDAL PERFORATIONS AND PERFORATIONS OF THE ILEUM. (Fr.) Le Peltier, P. *Med. Trop.* 31(4):417-425, 1971.

10373 A NEW INVAGINATION TECHNIQUE FOR INTESTINAL ANASTOMOSIS. (It.) Cataliotti, F. (U. Palermo Inst. Spec. Surg. Pathol., Italy), E. De Grazia, G. Di Gesu and L. Sodo. *Minerva Chir.* 26(17):941-946, 1971.

10374 PRACTICAL IMPORTANCE OF SMALL INTESTINE BIOPSY. (Pol.) Kalina, Z. (Med. Acad. Ist. Intern Dis. Clin., Katowice, Poland) and Z. Foremny. *Pol. Tyg. Lek.* 26(35):1354-1356, 1971.

10375 VILLOUS TUMORS OF THE JEJUNUM AND ILEUM. (Fr.) Hillemand, P. (Vaugirard Hosp., Paris), M. Roux and J. M. Muller. *J. Chir. (Paris)* 102(3):167-174, 1971.

10376 HYPOTHYROIDISM AND PARALYTIC ILEUS. (Jap.) Lakizaki, Y. (Hirosaki Natl. Hosp., Japan), T. Ohara and T. Matsuzaki. *Jap. J. Clin. Med.* 29(5):1427-1432, 1971.

10377 MALIGNANT MELANOMA, A RARE SMALL INTESTINE TUMOR. (Ger.) Richter, H. (City Hosp., Solingen, Germany), M. H. Oweyssi and B. Hain. *Internist. Prax.* 11(4):557-560, 1971.

10378 SMALL INTESTINE OBSTRUCTION DUE TO DUODENAL HEMATOMA. (Heb.) Ornoy, A. (Hadassah U. Hosp., Jerusalem), J. Ritchie and M. Schiller. *Harefuah* 81(6):273-275, 1971.

10379 MOUSE INTESTINAL SENSITIVITY TO CYCLOHEXIMIDE. A MORPHOLOGICAL, CYTOCHEMICAL AND BIOCHEMICAL STUDY. (E.) Hugon, J. S. (Univ., Med. Ctr., Sherbrooke, Quebec, Canada) and C. Charuel. *Histochemie* 27(1):50-62, 1971.

10380 ACUTE INTESTINAL OCCLUSION. (It.) Loddi, L. (U. Florence Geriatr. Surg. Clin., Italy) and A. Costa. *G. Gerontol.* 19(Suppl. 45):101-114, 1971.

10381 ILEUS AS THE LEADING SYMPTOM OF A RETROPERITONEAL FIBROSIS. (Ger.) Drugova, B. (Charles U. Radiol. Clin., Prague) and J. Kolar. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(3):400-402, 1971.

10382 INTESTINAL OBSTRUCTION DUE TO GIGANTIC CYSTIC TUMOR OF OVARY. (Por.) Ramiro, J. and J. Kane. *Folha Med.* 63(1):27-38, 1971.

10383 ACUTE VOLVULUS OF THE SMALL INTESTINE. (E.) Warambo, M. W. (Kenyatta Natl. Hosp., Nairobi). *East Afr. Med. J.* 48(5):209-212, 1971.

10384 PREVENTION OF ILEUS IN LAPAROTOMY FOR ILEUS AND PERITONITIS IN CHILDREN. (Ger.) Sauer, H. (Univ. Surg. Clin., Innsbruck, Austria). *Chirurg* 42(1):32-34, 1971.

10385 THE HANDLING OF WATER AND ELECTROLYTES BY THE SMALL BOWEL FOLLOWING THE RELIEF OF INTESTINAL OBSTRUCTION. (E.) Grace, R. H. (U. Liverpool Dept. Surg., England). *Br. J. Surg.* 58(10):760-764, 1971.

10386 RADIOLOGY OF THE MESENTERIC ISCHEMIAS. (Fr.) Diard, F. (St. Andre Hosp., Bordeaux, France), C. Larroude and J. Tavernier. *Bordeaux Med.* 4(9):2211-2248, 1971.

See also numbers: 10142, 10143, 10267, 10270, 10274, 10275, 10276, 10282, 10283, 10285, 10287, 10300, 10308, 10310, 10311, 10320, 10321, 10322, 10323, 10326, 10430, 10496, 10738, 10807, 10808, 10860

10387 LEUCOCYTE MIGRATION INHIBITION WITH KVEIM ANTIGEN IN CROHN'S DISEASE. (E.) Brostoff, J. (Middlesex Hosp. Med. Sch., London) and J. G. Walker. *Clin. Exp. Immunol.* 9(6):707-711, 1971.

Fourteen of 30 patients with Crohn's disease showed significant inhibition of migration of their WBC in the presence of Kveim antigen. Mean values for migration did not differ between 18 patients receiving corticosteroids and controls. Fifteen normal subjects and 14 of 16 patients with a variety of disease did not demonstrate migration inhibition. Twenty-four patients with idiopathic proctocolitis of varying grades of severity, 9 of whom were receiving corticosteroid therapy generally showed normal migration. A positive test may prove useful in differentiating Crohn's disease from idiopathic proctocolitis.

10388 CROHN'S DISEASE: PROGRESS CONFOUNDED. (E.) Mendeloff, A. I. (Sinai Hosp., Baltimore, Md.). *Ann. Intern. Med.* 76(1):137-138, 1972.

When a disease like Crohn's disease cannot be reproduced in laboratory animals, has no known etiologic agent, may reflect host factors rather than endogenous factors, and when it is complicated by long duration, secondary effects on the enterohepatic circulation produced by disease or surgery of it, malabsorption, bacterial overgrowth, arthritis, and liver disease, those concerned with the disease tend to involve themselves in patient management rather than fundamental approaches to its etiology and pathogenesis. New data has been presented on the possible primary of the submucosal response of the lymphocyte and the late and probably unessential granulomatous response. The submucosal reaction suggests that vessels and lymphatics of this layer bear the brunt of whatever the inciting agents may be and that the reactive capacity of the lymphocytes and plasma cells in this layer strongly influences the character of the resulting inflammation.

10389 CROHN'S DISEASE OF THE MOUTH. (E.) Bishop, R. P. (Naval Hosp., St. Albans, N. Y.), A. C. Brewster and D. A. Antonioli. *Gastroenterology* 62(2):302-306, 1972.

A single case is reported of a 30-yr-old white female whose initial complaint was of a nodular mass in the left mucobuccal fold, which, over a period of several months, increased in size and was joined by a similar lesion on the right. Three to 4 months later she noted the onset of frequency (2-10/day) loose bowel movements, usually associated with lower abdominal cramping pain, but without hematochezia. She lost 35-40 pounds over the next 12 months and experienced intermittent fever and polyarthralgia. She presented at this time and her physical examination was normal with the exception of the oral lesions. Sigmoidoscopy was normal and no perianal lesions were noted. Chest X-ray, upper gastrointestinal series, small bowel series and barium enema were normal, as were all pertinent laboratory tests with the exception of a persistently elevated sedimentation rate. An excisional biopsy of the oral lesion revealed an intense chronic inflammatory response with granulation tissue extending to the depths of the specimen. Deep within the specimen were numerous, large, well-formed noncaseating granulomas containing epithelioid cells, giant cells and peripheral lymphocytes. On reevaluation 11 months later, peripheral smears and bone marrow revealed a megaloblastic anemia and the Schilling test was normal. She improved on folate therapy. Sigmoidoscopy was normal, and a rectal biopsy (at 7 cm) revealed small granulomas in the lamina propria. Over the next 2 months she developed a perianal lesion, similar to the oral lesion, and a perianal abscess which responded to conservative therapy. A biopsy showed several well-formed noncaseating granulomas in the dermis. A barium enema showed an irregular reticulated pattern in the terminal ileum from extensive ulceration and edematous mucosa consistent with nonstenotic regional enteritis.

10390 INTESTINAL PROTEIN LOSS IN CROHN'S DISEASE. (E.) Beeken, W. L. (U. Vermont Dept. Med., Burlington), H. J. Busch and D. L. Sylwester. *Gastroenterology* 62(2):207-215, 1972.

Enteric protein loss exceeded 30 mg/kg/day in 21 of 30 patients with Crohn's disease; the maximal losses were 15 times normal. Serum albumin levels, however, were low in only 8 of the group, and serum globulins showed only minor inconsistent deviations on electrophoresis. Protein clearances showed correlation with the length of radiographically abnormal segment and involvement of upper and mid small bowel but not with xylose, lactose, B_{12} or fat absorption. Malabsorption of D-xylose, vitamin B_{12} and fat occurred in 14, 17, and 12 patients, resp, and correlated poorly with the extent and location of disease. The excellent correlation between intestinal protein loss and measurements of diseased segments suggests that protein clearance offers one of the best objective reflections of the extent of the lesion.

10391 SURGICAL MANAGEMENT OF FREE PERFORATION OF THE SMALL INTESTINE COMPLICATING REGIONAL ENTERITIS. (E.) Menguy, R. (U. Rochester Sch. Med., N. Y.). *Ann. Surg.* 175(2):178-189, 1972.

The surgical management by the author of 6 cases of small intestinal perforation in regional enteritis as well as 40 cases collected from the literature were surveyed to determine how best to manage this problem. Poor results followed simple suture-plication of perforated regional enteritis; those provided by resection and immediate anastomosis were better. The resection of the diseased intestine containing the perforation should be one of the basic principles underlying the management of this problem. Primary ileocolic anastomosis after resection is not indicated unless conditions are ideal. Existing peritonitis, the condition of the tissues due to prior steroid treatment, and the danger of not recognizing granulomatous colitis should be considered prior to any surgical procedure. The construction of a double-barrel cutaneous ileocolostomy prevents complications related to intra-abdominal anastomosis, allows postoperative evaluation and allows for secondary reconstruction under the protection of a bowel preparation. Delayed anastomosis does not usually require entry into the abdomen. Jejunal perforation is best treated by resection of the diseased loop and immediate re-establishment of continuity.

10392 INVESTIGATION OF THE PATHOGENIC MECHANISMS IN REGIONAL ENTERITIS WITH IN VITRO LYMPHOCYTE CULTURES. (E.) Parent, K., J. Barrett and I. D. Wilson (U. Minnesota Hosp., Minneapolis). *Gastroenterology* 61(4, Pt. 1):431-439, 1971.

Gastrointestinal contents from patients with regional enteritis were studied to determine if any antigenic substances responsible for the disease could be identified using lymphocyte culture techniques; and the capacity of the cellular immune system in these patients to respond to stimuli was assessed by phytohemagglutinin stimulation of their lymphocytes in the in vitro culture system. No substance which specifically stimulated lymphocytes from patients with regional enteritis could be found, and saline extracts of the intestines of these patients did not induce blast transformation of normal or patient lymphocytes. While the lymphocytes of patients with regional enteritis showed a decreased responsiveness to phytohemagglutinin stimulation, those from patients with ulcerative colitis responded normally. Transfer of this decreased responsiveness to the lymphocytes of normal subjects could not be accomplished with serum.

10393 CROHN'S DISEASE AND PERIOSTEAL NEW BONE FORMATION. (E.) Farman, J. (State U. New York Dept. Radiol., Brooklyn), E. L. Effmann and V. Grnja. *Gastroenterology* 61(4, Pt. 1): 513-522, 1971.

Two patients with periosteal new bone formation which occurred in association with chronic granulomatous disease of the bowel are presented. In both cases complaints of pain in larger joints led to radiographic examination; however, periosteal new bone formation was demonstrated without evidence of joint abnormality. One patient had extensive new bone formation around the lower femora, upper and lower tibiae, and fibulae while the other showed periosteal reaction along the shafts of the femora, tibiae, and fibulae, as well as the humeri. While both patients had severe sacroiliitis, only the latter had clubbing of the fingers and toes and knee effusion. Radiographic examination in patients with chronic granulomatous disease of the bowel and associated joint symptoms should uncover a higher incidence of osteoarthropathy than has been reported.

10394 PROGNOSIS AFTER ILEAL RESECTION FOR CROHN'S DISEASE. (E.) Kyle, J. (U. Aberdeen Dept. Surg., Scotland). *Br. J. Surg.* 58(10):735-737, 1971.

10395 WHIPPLE RESECTION FOR GRANULOMATOUS ENTERITIS OF DUODENUM. (E.) Goswitz, J. T. (Holy Family Hosp., Manitowoc, Wis.), H. P. Miller and M. A. Jacobi. *Wis. Med. J.* 70(9):197-199, 1971.

10396 PATHOGENESIS, CLINICAL FEATURES AND TREATMENT OF TERMINAL ILEITIS (CROHN'S DISEASE). (Rus.) Gniloripov, T. E. (Med. Inst., Minsk, USSR). *Vestn. Khir.* 107(9):132-135, 1971.

10397 REGIONAL ILEITIS (CROHN'S DISEASE). (Rus.) Boris, A. I. and E. V. Skobei. *Khirurgiia (Mosk.)* 47(9):74-77, 1971.

See also numbers: 9933, 10432, 10433, 10434, 10435, 10449, 10450, 10467, 10499, 10504

10398 THE INCIDENCE OF LACTOSE MALABSORPTION IN HEALTHY, YOUNG, PERUVIAN MALES. (Sp.) Calderón-Viacava, L. (Alexander von Humboldt Inst. Trop. Med., Lima, Peru), A. Cazorla-Talleri and R. León-BarÚa. *Acta Gastroenterol. Lat. Am.* 3(1):11-16, 1971.

The incidence of lactose malabsorption syndrome was exactly the same (63%) among 11 Peruvian young men (all university students) who drank little or no milk habitually (less than 250 ml/day; including 8 of 11 who drank none at all) and 33 comparable volunteers who drank 250 ml/day or more (including 20 of 33 who drank more than 500 ml/day). In all subjects, supplementary studies confirmed the absence of a generalized malabsorption syndrome. A discussion of previously reported studies, including the incidence of lactose malabsorption among several subgroups of Peruvian children, appeared to confirm that the relatively high frequency of the syndrome in Peru was primarily a product of environmental, rather than genetic or specific nutritional, factors.

10399 EFFECT OF PHYSIOLOGIC CONCENTRATION OF LACTOSE ON PREVENTION OF POSTWEANING DECLINE OF INTESTINAL LACTASE. (E.) Sriratanaban, A., L. A. Symynkywicz and W. R. Thayer, Jr. (Rhode Island Hosp., Providence). *Am. J. Dig. Dis.* 16(9):839-844, 1971.

Feeding rats lactose in a synthetic diet comparable to natural rat's milk failed to prevent postweaning decline of intestinal lactase. Data are presented which do not support the theory that postweaning decline of intestinal lactase reflects only a decreasing amount of substrate in the diet. Litters of rats were maintained on either a control (8% dextrose) or lactose-enriched diet (8% lactose) to investigate postweaning decline of intestinal lactase activity due to decreasing substrate concentration. The same number of calories was supplied by the 8% lactose as is present in maternal milk of rats. A continuum of activity was established by rats sacrificed at 3,4,5,8,12 and 16 weeks and assay of lactose activity in the jejunal and ileal segment mucosa. No significant difference was found in either lactase, sucrase, or maltase activity when expressed in terms of the whole intestine (per gram of intestine) or body weight (per 100 g).

10400 LACTOSE INTOLERANCE IN CANADIAN WEST COAST INDIANS. (E.) Leichter, J. (U. British Columbia Sch. Home Econ., Vancouver, Canada) and M. Lee. *Am. J. Dig. Dis.* 16(9): 809-813, 1971.

Data are presented which suggest a high incidence (63.3%) of lactose intolerance among West Coast Canadian Indians during adolescence. A group of 30 healthy Indians and 16 non-Indian (Northern European extraction) was used for lactose tolerance tests. Among the Indians: 7 males, 23 females; aged 14-24 yr (mean 15.8 yr). The non-Indians: 3 males, 13 females; ages 15-26 yr (mean 17.4 yr). The criteria for diagnosis of lactose deficiency included lactose activity of intestinal biopsies and the lactose tolerance test. Among the Indians, 19 (63.3%) were intolerant to lactose based on maximum blood glucose rise of less than 20 mg/100 ml above the fasting level after lactose load. Gastrointestinal symptoms were observed in 68.4% of the Indian subjects having a flat blood glucose curve and in 18.2% of the subjects with normal curves. Milk consumption among Indians was low by North American standards. In the 16 non-Indians, 1 was lactose-intolerant and none showed abdominal discomfort.

10401 STUDIES OF INTESTINAL TRANSPORT DEFECT IN HARTNUP DISEASE. (E.) Shih, V. E. (Massachusetts Gen. Hosp., Boston), E. M. Bixby, D. H. Alpers, C. S. Bartsocas and S. O. Thier. *Gastroenterology* 61(4, Pt. 1):445-453, 1971.

The intestinal absorption of amino acids was studied in 2 brothers with the characteristic aminoaciduria of Hartnup disease, and loading tests in vivo were compared with measurements of amino acid uptake by the intestinal mucosa in vitro. In vivo, leucine, lysine, and proline transport were normal, both brothers showed defective transport of tryptophan and phenylalanine, and in 1, methionine transport was abnormal. In vitro, methionine and tryptophan absorption were markedly decreased, but lysine and glycine were only minimally reduced. Following tryptophan loading, urinary excretion of tryptophan, indican, indoleacetic acid, and indolelactic acid were significantly increased and prolonged for 24 hr while kynurenine excretion was markedly decreased. Thus, defects in the transport of neutral amino acids can be demonstrated in vitro using jejunal mucosa obtained by biopsy from patients with Hartnup disease.

10402 SOY PROTEIN - ANOTHER CAUSE OF THE FLAT INTESTINAL LESION. (E.) Ament, M. E. (U. Washington Dept. Med., Seattle) and C. E. Rubin. *Gastroenterology* 62(2):227-234, 1972.

Fever, leukocytosis, cyanosis, vomiting, massive blood tinged mucoid diarrhea, dehydration, and metabolic acidosis occurred sequentially in a 6-week-old infant within 24 hr of changing his formula to soy milk. Symptoms subsided upon discontinuing soy milk. When, at 6 and 10 months, the patient was test-fed with soy milk formula and soy protein isolate, resp., symptoms recurred immediately. Previously normal jejunal mucosa became acutely inflamed and flat with loss of villi. Symptoms disappeared within 48 hr and villi regenerated within 4 days. Intestinal structure was unaltered by exposure to soy lecithin, gluten, and cow's milk. The number of circulating eosinophils or the total hemolytic complement did not change after soy milk exposure. Histologically, this reversible flat jejunal lesion was indistinguishable from that seen in untreated celiac sprue and several other rarer diseases.

10403 EFFECTS OF A BIGUANIDE (METFORMIN) ON VITAMIN B_{12} AND FOLIC ACID ABSORPTION AND INTESTINAL ENZYME ACTIVITIES. (E.) Berchtold, P. (U. Southern California Med. Sch., Los Angeles), A. Dahlqvist, A. Gustafson and N.-G. Asp. *Scand. J. Gastroenterol.* 6(8):751-754, 1971.

The effect of a biguanide (Metformin) treatment (2-10 weeks) on the activity of intestinal disaccharidases, hetero β-galactosidase, acid β-galactosidase and vitamin B_{12} and folic acid absorption was studied in man. Metformin treatment was followed by a decrease in the mean values of intestinal activity of maltase, isomaltase, and sucrase; however, this decrease was not sufficient to impair the disaccharide absorption. Trehalase and lactase activities were not decreased by treatment. All these disaccharidases are located in the brush border of the mucosal cells; the activities of acid β-galactosidase (a lysosomal enzyme), and the hetero β-galactosidase (of the epithelial cell cytoplasm) were not influenced by Metformin. The mean value for the absorption of radioactive vitamin B_{12} in the Schilling test decreased after Metformin treatment. Serum folic acid decreased after 2 months on Metformin treatment, while serum vitamin B_{12} and folic acid levels in whole blood did not change.

10404 PEPSIN SECRETION IN COELIAC DISEASE. (E.) Molla, A. M. (U. Leuven Dept. Pediatr., Belgium) and E. Eggermont. *Acta Paediatr. Belg.* 25(2):269-281, 1971.

Peptic activity in normal and celiac infants and children was measured with the use of the synthetic substrate N-acetyl-L-phenylalanyl-L-3, 5-diiodotyrosine. Pepsin output, following the injection of pentagastrin, was normal in celiac infants and children. The low basal secretion of the enzyme could be due to the altered intestinal phase of gastric secretion, secondary to the mucosal damage characteristic of active disease. The presence of a circulating inhibitor of gastric secretion known as gastrone could be an alternative explanation for the low basal pepsin secretion. Pepsin can apparently be produced adequately by the gastric mucosa of celiac patients.

10405 COMPETITION BETWEEN BACTERIA AND INTRINSIC FACTOR FOR VITAMIN B_{12}: IMPLICATIONS FOR VITAMIN B_{12} MALABSORPTION IN INTESTINAL BACTERIAL OVERGROWTH. (E.) Giannella, R. A., S. A. Broitman and N. Zamcheck (Boston City Hosp., Mass.). *Gastroenterology* 62(2):255-260, 1972.

The uptake of free vitamin B_{12} and vitamin B_{12} bound to intrinsic factor by bacteria was measured in an in vitro preparation. All bacteria studied took up vitamin B_{12} (binding of greater than 91.4% with Group A streptococcus, Proteus mirabilis, E. coli., Salmonella paratyphi and Klebsiella pneumoniae, 75.3% with Pseudomonas aeruginosa, and 66.0% with Staphyloccus aureus). This uptake was significantly, but not completely, inhibited by prior binding of vitamin B_{12} to intrinsic factor. The 6-hr uptake of B_{12} by E. coli (94.7%) was reduced to 20.2%, 16.7%, 14.7%, and 16.1% with binding of B_{12} to hog intrinsic factor, normal gastric juice, pernicious anemia gastric juice and saliva, resp; these differences were not significant. Uptake of free or bound intrinsic factor was not affected by the stage of bacterial growth or by lack of oxygen. Using ^{57}Co B_{12} to study the competition between bacteria and intrinsic factor for B_{12}, it was seen that most of the B_{12} was bound to intrinsic factor, except for P. mirabilis and K. pneumoniae, both of which bound 50% of the B_{12}. All the B_{12}-binding substances were capable of removing B_{12} that had bound to bacteria; the extent of removal was greater than 62% with all but Klebsiella and Proteus, where it was 10.7% and 3.4%, resp. Only the B_{12} attached to the bacterial cell wall, and not that transported into the cell, could compete with B_{12}-binding substances.

10406 LONG-TERM FOLLOW-UP OF ANTIBIOTIC-TREATED TROPICAL SPRUE. (E.) Rickles, F. R. (U. Rochester-U. Puerto Rico Hosp., San Juan), F. A. Klipstein, J. Tomasini, J. J. Corcino and N. Maldonado. *Ann. Intern. Med.* 76(2):203-210, 1972.

Subjects consisted of 17 patients available for follow-up who had been treated for tropical sprue between 1961 and 1965 with antibiotics for at least 6 months. All 17 had initially presented with diarrhea, anorexia, weight loss and megaloblastic anemia, while 9 also had glossitis. Various malabsorption states and histologic abnormalities had been noted. Thirteen had been treated with tetracycline and 4 with succinylsulfathiazole for 5-18 months (mean, 8.7 months), at the end of which 16 were asmptomatic and 15 had gained weight. Most showed improvement in the hematologic, histologic and absorptive pictures. Three required a second course of therapy because of gastrointestinal exacerbation occurring 6-24 months after termination of initial therapy; this second course led to permanent improvement in 1 and temporary improvement in 2, 1 of whom required 4 courses of tetracycline. Present follow-up was at 2, 4, or 5 yr in 1 each and after 6 yr in the rest. Fourteen are asymptomatic and 3 have recurrent episodes of diarrhea, anorexia, and crampy abdominal pains. Five gained more than 2.3 kg, while 6 lost more than this amount. Anemias in 5 consisted of deficiencies of iron (1), folate (2) and vitamin B_{12} (2). Fecal fat values were normal in 14, elevated in 3. Xylose absorption (measured by urinary excretion) was subnormal in 8, in 3 of whom peak serum concentrations were also subnormal; 7 of the 8 had normal xylose absorption immediately after antibiotic therapy. Absorption of vitamin B_{12} was subnormal in 13; 6 now subnormal had been among 8 with normal absorption immediately after therapy. Jejunal villous architecture showed improvement in 5, with return to normal in 4; in 3, villous architecture and infiltration of the lamina propria had become more abnormal.

10407 A SIMPLE SCREENING METHOD FOR LACTOSE MALABSORPTION. (E.) Isokoski, M. (U. Helsinki Dept. Public Health Sci.), J. Jussila and S. Sarna. *Gastroenterology* 62(1):28-32, 1972.

A simple screening method for lactose malabsorption which involved a single blood galactose determination 40 min after the simultaneous administration of oral lactose and alcohol was used to study 2 groups of hospital patients and a population sample. The specificity of the test was between 88 and 97% when the criteria were the rise in blood galactose or glucose after 40 min from the lactose administration, or if they were the loosening of stools or watery diarrhea following the test. If the criterion was abdominal complaints in general following the test, only 72-79% of those with low lactose absorption would have been correctly diagnosed. The sensitivity of the test was highest (96-100%) if the criterion was a blood galactose content of 5 mg/100 ml 40 min after the lactose administration. Abdominal complaints following the test seemed to be a good criterion for the hospital patients. Thus, the test consists of: 1) after fasting all night, 300 mg of ethanol/kg body weight is given p.o.; 2) after 15 min, 50 g of lactose dissolved in 400 g of water is given p.o.; 3) 40 min after giving the lactose, a capillary blood sample is taken and the galactose is determined. A galactose content of 5 mg/100 ml is considered a normal result.

10408 DISACCHARIDASES IN CELIAC DISEASE AND MUCOVISCIDOSIS. SOME CORRELATIONS BETWEEN HISTOLOGICAL, HISTOCHEMICAL AND BIOCHEMICAL STUDIES. (E.) Mališ, F. (Charles U. 2nd Res. Unit Gastroenterol., Prague), Z. Lojda, P. Frič and J. Jodl. *Digestion* 5(1):40-48, 1972.

Jejunal biopsies (115) of adults and children with celiac sprue or with mucoviscidosis were studied. Celiacs with active disease showed total mucosal atrophy, deeper crypts and enhanced cytoplasmic basophilia caused by RNA. Lamina propria edema and typical cellular infiltrate were found. Celiacs with remission showed subtotal atrophy and less marked edema and cellularization; mucoviscidosis patients showed no abnormal histological findings. All disaccharidases particularly, lactase and trehalase were decreased markedly in all patients with florid celiac sprue and only slightly decreased in half the cases with mucoviscidosis. After a gluten-free diet there was an increase in disaccharidase activities in cases of celiac sprue; the increase was greater than expected on the basis of histologic improvement. Histochemical methods are sufficient for the assessment of disaccharidase activities in routine practice.

10409 MALABSORPTION OF LACTOSE IN SPANISH STUDENTS. I. INTESTINAL TOLERANCE FOR PERORAL LOADING OF LACTOSE. (Sp.) Peña Yañez, A. (U. Granada 2nd Med. Clin., Spain), J. F. Peña Angulo and C. Juarez Fernandez. *Rev. Esp. Enferm. Apar. Dig.* 35(8):925-938, 1971.

Within 4-5 hr following ingestion of 50 g lactose in a 15% aqueous solution, 39 of 308 medical students (12.6%) developed diarrhea, stomach cramps, flatulence, sensations of fullness or swelling of the stomach, or other evidence of gastrointestinal disturbance attributed to intolerance. An additional 43 students (13.9%) were listed as cases of probable intolerance. The incidence of both "positive" and probable intolerance was appreciably higher among subgroups of students with a known intolerance for milk or a history of frequent diarrhea, flatulence, intestinal cramping and the like.

10410 COMPLEX STUDIES ON THE PATHOGENESIS OF DERMATITIS HERPETIFORMIS WITH SPECIAL EMPHASIS ON MALABSORPTION SYNDROME. (Ger.) Sönnichsen, N. (Univ. Dermatol. Clin., Berlin), J. Kölzsch, U. Franke, H. Bosseckert, H. Barthelmes, E. Miemiec, C. Engel and M. Feuerstein. *Dermatol. Monatsschr.* 157(9):631-644, 1971.

In addition to a variety of clinical, immunologic and usual laboratory studies, tests for the malabsorption syndrome (glucose, lactose, fat-xylose tolerance tests, Schiller test, determination of serum minerals, transaminases, lipase, amylase, oxyindoleacetic acid and fecal fat determination), radiology of gastrointestinal tract and biopsy of intestinal mucosa were performed on 8 patients with dermatitis herpetiformis and on 5 with prurigo simplex. No definite indications for the existence of a primary or secondary malabsorption syndrome in patients with dermatitis herpetiformis were found. Most noteworthy was a deficiency in disaccharidase activity in the mucous membrane of the small intestines. The 2 groups of patients showed differences in enzyme activity; patients with dermatitis herpetiformis had a lactase deficiency and a pathologic saccharase/lactase quotient. Pathologic xylose values were obtained in 2 of 7 and a slightly pathologic Schilling test in 3 of 5 patients tested. Biopsy of the small intestine revealed no partial or subtotal atrophy of villi in 4 of 5 patients tested, and a focal superficial enteritis in 1 of 5. Oxyuriasis was present in 1, intolerance to milk in 1, intolerance to fat and iodide-containing foods in 3 of 8. Differential diagnosis, pathogenesis and relationship between changes in the skin and intestines is discussed and it is suggested that these changes are caused by a common noxious agent.

10411 DETERMINATION OF PRECIPITATING ANTIBODIES AGAINST GLIADIN AS A CHECK ON THE OBSERVANCE OF A GLUTEN-FREE DIET BY PATIENTS WITH CELIAC DISEASE. (Ger.) Rossipal, E. (Univ. Pediatr. Clin., Graz, Austria). *Arch. Kinderheilkd.* 183(3):270-276, 1971.

In three 1-yr-old children with celiac disease, precipitating antibodies against gliadin were present in a moderate-to-marked degree, prior to initiating a gluten-free diet. The antibodies were shown to be contained in gamma globulin G, with a half-life which ranged from 27-36 days. Subsequent determinations, repeated at intervals of 2 months, confirmed unbroken maintenance of the gluten-free diet by 1 of 3 patients; indicated failures to observe the prescribed regimen absolutely in 2 of 3, even before the emergence of clinical symptoms which resulted from such failure. The method, which combines electrophoresis with a 2-dimensional immunodiffusion technique, is suggested as a practicable way of ensuring parental cooperation in the dietary treatment of this disorder.

10412 INTESTINAL DISACCHARIDASE ACTIVITY IN ADULTS AND IN CHRONIC DRINKERS OF PILSEN BEER. (Fr.) Madzarovova-Nohejlova, J. (Charles U. Sch. Med., Plzen, Czechoslovakia). *Arch. Fr. Mal. App. Dig.* 60(12, Suppl. 4):325-332, 1971.

In 80 patients with chronic diarrhea (26-80 yr old), the activity of intestinal lactase, cellobiase, trehalase, saccharase and maltase was determined in specimens of proximal jejunal mucosa. As compared to 20 normal controls, 24 of 80 patients (including 12 of 24 who were unable to tolerate milk) showed significantly decreased lactase and cellobiase activity, suggesting an acquired enzyme deficit. Among 10 of 80 who reported drinking a minimum of one liter per day of a beer rich in maltose and maltotriose, for periods of 10 yr or more, saccharase and maltase activities were both decreased significantly, suggesting enzyme exhaustion. Note is made that the jejunal mucosa was histologically normal in all 80 patients.

10413 GLUCOSE ABSORPTION KINETICS IN ZAMBIAN AFRICAN PATIENTS WITH AND WITHOUT SYSTEMIC BACTERIAL INFECTIONS. (E.) Cook, G. C. (U. Zambia Dept. Med., Lusaka). *Gut* 12(12): 1001-1006, 1971.

Glucose absorption kinetics were studied in a group of Zambian African patients with and without systemic bacterial infections, and galactose absorption kinetics were studied in relatively normal Zambian Africans. From the 2.5 and 5.0 g/100 ml glucose solutions the absorption rates were depressed in the groups with infections. The correlation between absorption rates from the 2.5 and 5.0 g/100 ml solutions was significant. Correlations between the individual absorption rates and age, body weight, hemoglobin, serum albumin and total globulin concentrations were not significant. The correlation between 5-hr D-xylose excretion and glucose absorption rate from both solutions was significant. Water absorption from both solutions was also significantly depressed in the groups with infections, the correlation between absorption rates from the two solutions again being significant. Correlation between individual glucose and water absorption rates was significant. The mean galactose kinetic curve was slightly lower than that for glucose in the normal group. The data suggest that systemic bacterial infections can produce malabsorption.

10414 THE EFFECT OF FAT ON CALCIUM ABSORPTION FROM A MIXED MEAL IN NORMAL SUBJECTS, PATIENTS WITH MALABSORPTIVE DISEASE, AND PATIENTS WITH A PARTIAL GASTRECTOMY. (E.) Agnew, J. E. (Roy. Free Hosp., London) and C. D. Holdsworth. *Gut* 12(12):973-977, 1971.

The effect of feeding medium-chain triglycerides was compared with that of feeding long-chain triglycerides on the absorption of calcium in normal human subjects, in patients with partial gastrectomy, and in patients with various types of malabsorption. In each group of subjects absorption from the meal containing medium-chain triglyceride was similar to that from the meal containing no added fat. In contrast, long-chain triglyceride depressed calcium absorption. Calcium absorption was better from the meal mixed with medium-chain triglyceride than from the long-chain triglyceride meal, the difference being significant in normal subjects and patients with partial gastrectomy, but not in patients with malabsorption. Mean calcium absorption measured by the whole body counter was higher in patients with a partial gastrectomy than in normal subjects from meals with no added fat and with added medium-chain triglyceride, but not from the meal with added long chain triglyceride. Plasma ^{47}Ca levels also showed greater calcium absorption by patients with a partial gastrectomy from the meal with no added fat and with added medium chain triglyceride. In patients with a partial gastrectomy there was a significant inverse relationship between calcium intake and calcium absorption from each of the meals. In patients with malabsorption, all patients with a daily fecal fat excretion of 10 g absorbed calcium poorly.

10415 BACTERIAL FLORA OF THE GASTROINTESTINAL TRACT IN SOUTHERN INDIAN CONTROL

SUBJECTS AND PATIENTS WITH TROPICAL SPRUE. (E.) Bhat, P. (Christian Med. Coll. Hosp., Vellore, India), S. Shantakumari, D. Rajan, V. I. Mathan, C. R. Kapadia, C. Swarnabai and S. J. Baker. *Gastroenterology* 62(1):11-21, 1972.

Subjects consisted of 33 patients with tropical sprue and 12 apparently healthy asymptomatic controls who were subjected to peroral intubation with aspiration of contents from the stomach, proximal and distal jejunum, and proximal and distal ileum; samples of saliva and stool were also obtained. Of the controls, 8 had viable bacteria in the proximal jejunum (10^2 to 10^7/ml) and all had organism through the ileum (mean of 10^5/ml). In the saliva the pattern of bacterial flora was similar in controls and patients, the predominant organisms being neisseriae, fusobacteria, streptococci, veillonellae and bacterioides. Organisms in fasting gastric juice samples resembled those in saliva, and there was no significant difference between patient groups with respect to total flora or individual organisms. In the upper jejunum, viable organisms were found in 29 patients and 8 controls. The oral flora were present in smaller numbers than in the stomach and enterobacteria were seen in 50% of controls and 67% of sprue patients, but this difference (mean log count) was not significant. In the distal jejunum and proximal ileum, there was a decrease in oral flora and an increase in enterobacteria; there was no significant difference between the 2 groups. The total number of recovered viable organisms in the stool was similar in both groups, but the mean counts of enterobacteria and veillonellae were higher in sprue patients than in controls. In controls, the ratio of anaerobes: aerobes was always greater than 1.0, while it was less than 1.0 in 21 patients; in the patients this ratio increased with duration of disease and was due to increased numbers of anaerobes. There was no correlation between bacteriological findings and course of disease or response to therapy. Enterobacteria were increased in the upper jejunum in those with a convoluted jejunal mucosal pattern (in contrast to those with leaf-shaped villi) and in those with an abnormal barium meal. Bacteriological findings were also not correlated with degree of malabsorption of fat, xylose, or vitamin B_{12}, urinary indican excretion, serum or RBC folate concentration or serum vitamin B_{12} concentration. Upper jejunal streptococci were also increased in those with convoluted jejunal mucosa.

10416 A NEW ENTITY: MEDITERRANEAN LYMPHOMA WITH ALPHA CHAIN DISEASE. (Sp.) De Roissard, F. *Rev. Clin. Esp.* 121(6):555-558, 1971.

10417 ANTI-RETICULIN ANTIBODIES IN CHILDHOOD COELIAC DISEASE. (E.) Seah, P. P. (St. Mary's Hosp., London), L. Fry and M. A. Rossiter. *Lancet* 2(7726):681-682, 1971.

10418 MASSIVE RESECTION OF THE SMALL INTESTINE AND THE MALABSORPTION SYNDROME. (Sp.) Etala, E. (U. Buenos Aires Sch. Med., Argentina). *Prensa Med. Argent.* 58(29):1467-1476, 1971.

10419 GASTROINTESTINAL LOSS OF ENDOGENOUS FATTY ACIDS IN STEATORRHEA OF VARIOUS ORIGIN. (Ger.) Begemann, F. (Univ. 1st Med. Clin., Hamburg, Germany). *Klin. Wochenschr.* 49(2):110-111, 1971.

10420 DIAGNOSIS OF HEREDITARY SACCHAROSE ISOMALTOSE MALABSORPTION. (Ger.) Beyreiss, K. (Karl Marx U. Pediatr. Clin., Leipzig, Germany), U. Winkler and H. Theile. *Kinderaerztl. Prax.* 39(8):345-356, 1971.

10421 HYPOKALEMIC TETRAPARESIS IN THE MALABSORPTION SYNDROME. (Ger.) Benohr, H. C. (Univ. Med. Clin., Tubingen, Germany), H. D. Lang and W. Wilmanns. *Med. Welt* 22(36):1363-1365, 1971.

10422 A SYNDROME OF CONGENITAL APLASIA OF THE ALAE NASI, DEAFNESS, HYPOTHYROIDISM, DWARFISM, ABSENT PERMANENT TEETH, AND MALABSORPTION. (E.) Johanson, A. (U. Virginia Sch. Med., Charlottesville) and R. Blizzard. *J. Pediatr.* 79(6):982-987, 1971.

10423 COELIAC DISEASE PRESENTING AS RECURRENT ABORTION. (E.) Joske, R. A. (U. Western Australia Dept. Obstet. Gynecol., Perth) and J. D. Martin. *J. Obstet. Gynaecol. Br. Commonw.* 78(8):754-758, 1971.

10424 NEUROLOGICAL MANIFESTATIONS IN ADULT STEATORRHOEA. (PROBABLE GLUTEN ENTEROPATHY). (E.) Banerji, N. K. (Roy. Victoria Hosp., Belfast, Ireland) and L. J. Hurwitz. *J. Neurol. Sci.* 14(2):125-141, 1971.

10425 INTOLERANCE OF COW'S MILK AS THE CAUSE OF MALABSORPTION SYNDROME IN CHILDREN. (Cz.) Pelikan, L. (Palacky U. Med. Sch., Olomouc, Czechoslovakia). *Cesk. Pediatr.* 26(6):272-274, 1971.

See also numbers: 10257, 10503, 10782, 10814, 10846, 10858, 10859

10426 PERFORATION OF THE CECUM ASSOCIATED WITH HYPOKALEMIC ILEUS. REPORT OF A CASE. (E.) Muggia, A. L. (U. New Mexico Dept. Med., Albuquerque). *Am. J. Gastroenterol.* 57(2): 169-171, 1972.

Report of a case of perforation of a healthy cecum during severe ileus which may reflect another danger of persistent severe hypokalemia. The treatment of choice is cecostomy and should be considered when cecal perforation appears imminent and potassium replacement is inadequate. The patient was a 56-yr-old alcoholic cirrhotic male admitted with pneumonia and positive blood culture for pneumococcus. He developed hepatic precoma and massive dilation of the colon and small intestine. Serum potassium was low and attempts at replacement were unsuccessful. At laparotomy, a small necrotic area was noted in the dilated cecum and emergency cecostomy was done. The postoperative course was uneventful and the serum potassium returned to normal. Toxic dilation of the colon may be found in amebic colitis, regional enteritis, ulcerative colitis, and associated with opiates or anticholinergic drug therapy. In cases of severe hypokalemia, no other disease need be present to explain cecal perforation.

10427 CARCINOMA OF THE COLON WITH LIVER METASTASES. OPERATIVE INDICATIONS AND PROGNOSIS. (E.) Nielsen, J. (Municipal Hosp., Copenhagen), I. Balslev and H.-E. Jensen. *Acta Chir. Scand.* 137(5):463-465, 1971.

The effect of various procedures in the treatment of carcinoma of the colon with liver metastases was studied in 103 patients with this condition. The average survival times were: unoperated patients, 1.1 months; patients undergoing a relieving procedure or laparotomy, 5 months; patients whose tumors were extirpated, 12.3 months. After palliative resection, 15 of 38 patients survived for more than 1 yr. The survival time in patients with few, several or multiple liver metastases (determined by the surgeon) were 18, 9 and 5 months, resp. The difference in survival time between patients with few and multiple metastases was significant. After laparotomy and no further procedure, or a relieving procedure, there was no significant difference in the survival times related to the extent of the metastases. Patients with few metastases survived longer after resection than after a relieving procedure or laparotomy.

10428 PRIMARY CLOSURE OF PERINEAL WOUND AFTER PROCTOCOLECTOMY OR RECTAL EXCISION. (E.) Hultén, L. (Sahlgrenska Hosp., Goteborg, Sweden), J. Kewenter, U. Knuttson and L. Olbe. *Acta Chir. Scand.* 137(5):467-469, 1971.

The effect of primary closure of the perineal wound in combination with extraperitoneal closed suction drainage of the pelvic cavity after proctocolectomy or rectal excision on healing, postoperative care, and morbidity was studied in 36 patients. The perineal wound healed per primum in 27 of the 36 treated cases. All 6 failures in the ulcerative colitis patients were due to perineal abscesses; the 2 failures in Crohn's disease patients were due to a hematoma in one case and a perineal abscess in the other; and an abscess was also the reason for the wound dehiscence after a rectal excision for carcinoma. In all 9 cases local treatment and continuous irrigation was followed by proper healing which corresponded in time to those cases which were treated by the conventional "open" closure and drainage. In patients where primary healing of the perineal wound occurred, the mean hospital stay was 14 days compared with a mean of 20 days for conventional procedures.

10429 RECTAL CANCER AND MULTIPLE SUBCUTANEOUS LIPOMA. REPORT OF TWO CASES. (E.) Kjersgaard Johansen, J. (Cent. Hosp., Noestved, Denmark) and R. Nielsen. *Acta Chir. Scand.* 137(7):696-699, 1971.

Two siblings, a 64-yr-old male and a 63-yr-old female, simultaneously presented with rectal carcinoma from polyps of the rectum. In the male, polyps were dispersed throughout the colon. Radiography of the skull disclosed no osteoma but atrophy of the alveolar processes were associated with earlier loss of the teeth. At laparotomy, fibrous adhesions were throughout the abdomen (a cholecystectomy had been performed 19 yr earlier) and the tumor was inoperable. Several s.c. tumors were removed and proved to be lipomas. The sister had a carcinoma and several polyps resected along with the sigmoid colon. Two additional polyps in the colonic stump were removed by electrocoagulation. Radiography of the cranium demonstrated the same picture as her brother's. A lipoma was removed from the right forearm. In patients with Gardner's syndrome a larger variety of s.c. nodules have been described, but with no mention of lipomas. These patients demonstrated several of the criteria of Gardner's syndrome but no osteomas and the findings of the s.c. lipoma were remarkable and had not previously been considered a component of Gardner's syndrome.

10430 SURGICAL ASPECTS OF RADIATION INJURY TO THE SMALL AND LARGE INTESTINES. (E.) Dencker, H. (U. Lund Dept. Surg., Sweden), J. E. Johnsson, G. Liedberg and S. Tibblin. *Acta Chir. Scand.* 137(7):692-695, 1971.

A study of 17 patients with radiation damage to the small and/or large intestine but excluding patients with injury only to the rectum. The primary indication for radiation in 11 cases had been carcinoma of the cervix, in 4 cases carcinoma of the bladder, and 1 each for carcinoma of the sigmoid and a malignant lymphoma. In 9 cases the radiation injury was in the colon, in 4 cases within the small intestines, and in 4 in both small and large intestine. Stricture was the type of lesion found in 12 cases, internal fistula in 3, and perforation in 2. No recurrent carcinoma was found at laparotomy. Surgical intervention took place because of suspected malignancy in 7 cases, 2 because of perforation, and 1 for ileus and was followed by many complications. Resection was done in 8 of the 14 cases at first operation with the resultant development of anastomotic leakage in 4 with 1 death due to sepsis and another death after intestinal resection. These studies indicate that surgery should be undertaken only on vital indications, not in cases of suspected malignancy. The surgical procedure should be conservative, if possible taking the form of proximal decompression by intestinal by-pass and avoidance of primary anastomosis.

10431 THE IRRITABLE COLON SYNDROME. A FOLLOW-UP STUDY WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF DIVERTICULA. (E.) Havis, T. (U. Turku Dept. Surg., Finland) and R. Manner. *Acta Chir. Scand.* 137(6):569-572, 1971.

This study of 88 patients with the irritable colon syndrome revealed that the symptoms began before 30 yr of age in 18 cases, between 30 and 50 in 50 cases and after 50 in 20 cases. Pain was the most common symptom, being intermittent in 64 cases and continuous in 8 cases. Bowel action was disturbed in 67 of the 88 patients. No relationship to food and symptomatology was noted in 55 patients. Symptoms had lasted more than 10 yr in 42 patients (48%). Forty of the 88 patients had received no treatment, 26 had intermittent drug therapy, 4 constant drug therapy, 9 intermittent diet therapy, and 9 constant diet treatment. The most striking feature was the frequency of previous abdominal surgery (60%); however, no relationship between the prior surgery and commencement or termination of symptoms could be obtained. A simple diverticula (6 cases) or multiple diverticulosis (15 cases) was demonstrated in 24% of the patients. The average frequency of diverticulosis was expected to be 12%. This occurrence, which is twice that expected, raises questions of the necessity for treatment of the irritable colon syndrome since this syndrome seems to play a role in the pathogenesis of colonic diverticulosis.

10432 THE SURGICAL TREATMENT OF ANORECTAL LESIONS IN CROHN'S DISEASE. (Fr.) Loygue, J. and M. Huguier. *Arch. Fr. Mal. App. Dig.* 60(10-11, Suppl.):29-34, 1971.

Anorectal lesions were demonstrated in 35 of 120 patients who were operated for Crohn's disease: prior to surgery, in 28 of 35 (with 3 of 28 also developing anorectal lesions after surgery); following surgery, only, in 7 of 35. Preoperative lesions were found in 4 of 49 who showed no colonic involvement; 2 of 25 in whom the ileum and right colon were affected; 22 of 46 in whom the left colon was affected, with or without involvement of the right colon and/or small intestine. Among 23 patients with minor anorectal lesions, ablation of the lesions was achieved in all 3 treated by topical medication, all 6 treated by cicatrization without resection and 11 of 14 treated by cicatrization prior to radical intestinal surgery. Amputation of the rectum, with total or subtotal colectomy and ileostomy was performed in 11 of 15 with major anorectal lesions. Attempts to preserve the rectum in 4 of 15, by ileorectal (3 of 4) or colorectal (1 of 4) anastomosis, failed in 3 of 4 cases. Subsequent surgery included amputation of the rectum and ileostomy (2 of 3) or resection of the colorectal anastomosis and colostomy (1 of 3).

10433 CLINICAL SIGNS OF ANORECTAL FOCI OF CROHN'S DISEASE. (Fr.) Crismer, M. R. (U. Liege, Belgium). *Arch. Fr. Mal. App. Dig.* 60(10-11, Suppl.):3-16, 1971. (27 references)

A review, supplemented by a summary of 8 new and 14 previously published cases, discusses diagnosis, differential diagnosis, spontaneous evolution of lesions, and recommended treatment.

10434 PATHOLOGIC ANATOMY OF CROHN'S DISEASE OF THE RECTUM. (Fr.) Morson, M. B. C. (St. Mark's Hosp., London). *Arch. Fr. Mal. App. Dig.* 60(10-11, Suppl.):17-22, 1971. (3 references)

A review of the differential diagnosis of Crohn's disease from ulcerative colitis and other inflammatory disorders includes discussion of precautions in the handling of biopsy specimens.

10435 SURGICAL TREATMENT OF ANORECTAL LESIONS IN CROHN'S DISEASE. (Fr.) Lockhart-Mummery, H. H. E. (St. Mark's Hosp., London). *Arch. Fr. Mal. App. Dig.* 60(10-11, Suppl):23-28, 1971.

In a hospital series of unspecified size, perianal lesions were found at some time in the course of Crohn's disease in 25% of the patients in whom the terminal ileum alone was affected, 75% of those in whom the colon was involved, approximately 100% of those in whom the rectum was extensively invaded. Included were edematous hemorrhoids; both minor and major ulceration; perianal, ischiorectal and pelvirectal abscesses; low anal fistulae; suprasphincteral rectovaginal and other rectal or high anal fistulae; and extensive necrotic lesions involving destruction of considerable portions of the anal canal. In some cases, such anorectal lesions were the first sign of the disorder, preceding the development of abdominal symptomatology by several yr. In a similar series of patients with ulcerative colitis, perianal lesions were found in only 7% of an unspecified number of patients, consisting primarily of minor, s.c. or submucosal, fissures or fistulae which were readily susceptible to local treatment. Rectovaginal or other rectal or high anal fistulae were found in only 3% (total) of these patients. The principles governing treatment of Crohn's disease (which ranges from local medication or drainage to radical surgery) are discussed at length.

10436 ORIGIN AND TREATMENT OF SIGMOID PERFORATIONS.

(Ger.) Böhme, H. (Essen Clin., Germany), G. Jacobs and H. Berghaus. *Bruns Beitr. Klin. Chir.* 218(8):698-704, 1971.

The pathogenic mechanisms of acute and protracted perforations of the sigmoid colon are reviewed. Acute perforation caused by external factors (air pressure, trauma, iatrogenic, idiopathic) are compared with spontaneous ruptures of the colon, previously damaged by diverticulitis, carcinoma, colitis, necroses, amebiasis, typhus or tuberculosis. The possibility and mechanisms of fistula formation in protracted perforations is discussed, and the difficulties and importance of differential diagnosis is stressed. In acute perforations the prognosis is best if surgery is performed within the first 6 hr. Various techniques such as primary resection, resection with colostomy, transposition, suture and drainage, with indications for each type are briefly reviewed. It is stressed that choice of surgical method ultimately depends on the characteristics of each individual case. The authors' own results (7 fatalities out of 20) are comparable to the 30% mortality reported in the literature.

10437 ANTERIOR RESECTION VERSUS ABDOMINOPERINEAL RESECTION FOR CANCER OF THE RECTUM AND RECTOSIGMOID. AN ANALYSIS OF 524 CASES.

(E.) Slanetz, C. A., Jr. (Columbia Presbyterian Med. Ctr., New York, N. Y.), F. P. Herter and R. S. Grinnell. *Am. J. Surg.* 123(1):110-117, 1972.

Anterior resection (247 consecutive cases) was accompanied by lower morbidity (thromboembolism, urinary tract obstruction and infection, bowel perforation) and mortality rates than is abdominoperineal resection. The level of the tumor between 8 and 18 cm from the anal verge was not related to survival or recurrence rates, and should not influence the surgeon's choice of procedure as long as an adequate distal margin of resection can be provided. Local recurrence rates were determinants more of the pathologic nature of the disease than of the procedure performed. Suture line recurrence and obstruction after anterior resection should not influence the choice of procedure. Primary tumor local extension and inadvertent bowel perforation during operative dissection both prejudiced survival and local recurrence rates. Women had more frequent lymphatic metastasis from carcinoma of the rectum and rectosigmoid.

10438 ANASTOMOTIC LEAKAGE AFTER LOW COLONIC ANASTOMOSIS. CLINICAL AND EXPERIMENTAL ASPECTS.

(E.) Morgenstern, L. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.), T. Yamakawa, M. Ben-Shoshan and H. Lippman. *Am. J. Surg.* 123(1): 104-109, 1972.

Seventy cases of anastomotic leakage occurred after 178 low anterior resections performed for carcinoma and 123 segmental sigmoid resections for diverticulitis. Major leaks (eventuating in death, spreading peritonitis or severe complications of sepsis) occurred almost exclusively in those patients undergoing primary resection, without preliminary or concomitant colostomy. Seven of 8 deaths occurred in patients who had not received colostomy. Anastomotic leakage was slightly more frequent after low anterior resection for carcinoma, as was the incidence of major leaks. In an experimental study on 21 dogs mortality from anastomotic leakage was 4 times more frequent in the group undergoing resection for diverticulitis, leakage rate was higher after resection of inflamed colonic segments and collagen synthesis at the anastomotic site in the diverticulitis group was impaired. Systemic factors associated with clinical leakage were advanced age, obesity, and poor nutritional status. A scheme for grading factors which favor anastomotic dehiscence was presented, with recommendations for relative and absolute indications for staging as opposed to primary resection.

10439 URINARY TRACT COMPLICATIONS OF ANORECTAL SURGERY.

(E.) Tank, E. S. (Univ. Hosp., Ann Arbor, Mich.), C. B. Ernst, S. T. Woolston and J. Lapides. *Am. J. Surg.* 123(1): 118-122, 1972.

The anorectal abnormalities of the subjects studied were carcinoma of the anus and rectum (150), anorectal atresia (100), ulcerative colitis (50), and Hirschsprung's disease (35). In surgery of carcinoma of anus and rectum, 8 ureters were injured intra-operatively with successful reconstruction in 6. Three cases of bladder damage were seen; 1 was recognized and repaired intra-operatively whereas a vesicoperineal fistula developed in the other 2. Accidental urethral avulsion was seen in 1 patient. Difficulty in bladder emptying complicated the postoperative course in 30% of patients undergoing combined abdominoperineal resection. Complete preoperative urologic evaluation will permit anticipation, if not avoidance, of many of these complications. No iatrogenic injuries to the lower urinary tract occurred following abodominoperineal resection for ulcerative colitis or pull-through procedures for Hirschsprung's disease. Only a few urethral injuries accompanied pull-through procedures for high anal atresia; however, common (45%) associated genitourinary anomalies must be recognized and treated.

10440 SURGICAL TREATMENT OF HIRSCHSPRUNG'S DISEASE: COMPARISON OF MODIFICATIONS OF THE DUHAMEL AND SOAVE OPERATIONS. (E.) Soper, R. T. (U. Iowa Med. Ctr., Iowa City) and P. R. Figueroa. *J. Pediatr. Surg.* 6(6):761-766, 1971.

Twenty-nine patients with Hirschsprung's Disease who were treated by a modification of the Duhamel (16 patients) or Soave (13 patients) operations are reported. All patients in both treatment groups had preliminary colostomies as the first stage of their surgical management, with the exception of 1 neonate in each group who was subjected to a primary definitive operation. Thirteen of the 16 patients with the modified Duhamel operation had postoperative colostomies, and 11 of 13 patients undergoing the modified Soave operation had postoperative colostomies. The procedures were comparable with regard to the anesthesia time and average length of postoperative hospital stay. Operative blood loss (percentage of circulating blood volume) was greater with the modified Soave operation (25%) than with the modified Duhamel operation (18%), especially in children older than 2 yr of age. Early postoperative complications were similar in the 2 groups, but late postoperative complications were much more numerous after the modified Duhamel procedure (none being observed after the modified Soave operation). Of the 28 patients who were followed-up, on the basis of 10 criteria, 80% were judged to have excellent or good results after the modified Duhamel procedure, compared with 92% following the modified Soave technique.

10441 FURTHER EXPERIENCE IN THE DIAGNOSIS AND SURGICAL TREATMENT OF SHORT-SEGMENT HIRSCHSPRUNG'S DISEASE AND IDIOPATHIC MEGACOLON. (E.) Nissan, S. (Cent. Emek Hosp., Afula, Israel) and J. A. Bar-Maor. *J. Pediatr. Surg.* 6(6): 738-741, 1971.

Twenty-nine patients with short-segment Hirschsprung's Disease who were diagnosed histologically and treated by anorectal myectomy and 24 patients with idiopathic megacolon were studied. The patients with idiopathic megacolon showed a similar clinical picture but failed to respond to a medical regimen and upon undergoing an anorectal myectomy were found to have normal rectal histology. The clinical features characteristic of both disorders were constipation, fecal impaction in the rectal ampulla, encopresis, enuresis, good health, late onset of symptoms, and delayed evacuation following a barium enema. Relaxation of the internal sphincter responding to an increase in pressure in the rectal ampulla was noted in the short-segment group before and after myectomy. A normal defecation reflex was seen in the idiopathic megacolon group. Following myectomy 19 patients with short-segment Hirschsprung's Disease and 8 with idiopathic megacolon were promptly relieved of their symptoms. Most of the other patients in the former group showed considerable improvement after surgery while only some did in the latter group. Few complications were noted in the follow-up period.

10442 LATE REPAIR OF INJURIES OF THE ANAL SPHINCTER. (E.) Parks, A. G. (St. Mark's Hosp., London) and J. F. McPartlin. *Proc. R. Soc. Med.* 64(12):1187-1189, 1971.

Twenty patients with anal sphincter damage, either lateral or posterior muscle section due to fistula operation or anterior inquiries, sufficient to cause appreciable loss of anorectal control are reported. Anterior muscle section is treated relatively successfully because the puborectalis sling is always intact and it requires only a bar of fibrous tissue in front of the anal canal for reasonable sphincter action. In lateral and posterior injuries, however, the puborectalis also is divided so that all muscles of continence are cut and must be repaired. All patients with anterior injuries had good results except one who refused a temporary fecal diversion and who also had Crohn's disease. Ten of 12 with lateral or posterior injuries had excellant results; 2 had lost some control of flatus. Objective assessment of sphincter activity revealed normal pressures of 85, 70, 125 and 85 cm H_2O in 4 patients. Sphincter repair following muscle section, whatever the cause, can be satisfactorily performed, provided a temporary colostomy is established.

10443 CONTINENCE AND THE YIELD PRESSURE OF THE ANUS. (E.) Long, W. J. (Hosp. Sick Child., London) and H. H. Nixon. *Proc. R. Soc. Med.* 64(12):1189-1190, 1971.

A 2-mm diameter probe bearing a small inflatable balloon was inserted anally into 74 patients with various diseases (Hirschsprung's Disease, imperforate anus, neurogenic disorder and chronic constipation). A continuous record of pressure was made during 0-0.5 ml increments of air given at 2-sec intervals. In the 15 patients who had persistent soiling there was a close correlation with a low yield pressure. Eleven of these patients had a yield pressure of less than 25 and only 1 exceeded 50 cm H_2O. However, half of these showed a normal resting and/or maximal anal canal pressure. Of the moderate soilers the yield pressure was less than 25 cm H_2O in 9 of the 14 who soiled as a concomitant to loose stools, whereas it was greater than 50 cm in all but 1 of the patients with overflow soiling associated with exacerbation of constipation. Only 2 of 37 clean patients had low yield pressures; clinical assessment by digital examination correlated less well.

10444 CLINICAL ATTEMPTS AT ANASTOMOSIS IN ONE STAGE DURING RESECTIONS OF THE COLON. (Fr.) Hasse, J. (Bourgeois Hosp., Basel, Switzerland), W. A. Jaques and M. Allgower. *Med. Hyg.* 29(972):1187-1189, 1971.

10445 ANGIOGRAPHIC APPEARANCE OF A CASE OF SIGMOIDITIS PRODUCED BY RADIUM THERAPY. (Fr.) Fays, J., J. M. Simon and B. Richaume. *J. Radiol. Electrol. Med. Nucl.* 52(8-9):536-540, 1971.

10446 ACTION OF SENNOSIDES AND RELATED COMPOUNDS ON THE HUMAN COLON. (E.) Wilkins, J. L. (U. Nottingham Dept. Surg., England) and J. D. Hardcastle. *J. R. Coll. Surg. Edinb.* 16(5):275-276, 1971.

10447 THE VALUE OF Sr(87m) SCINTIGRAPHY IN THE PALLIATIVE RADIOTHERAPY OF RECURRENT COLORECTAL CANCER. (Fr.) Papavasiliou, C. (U. Athens, Sch. Med.), P. Kostamis and C. Constandinidis. *J. Radiol. Electrol. Med. Nucl.* 52(8-9):497-500, 1971.

10448 COLITIS CYSTICA PROFUNDA. CLINICAL AND HISTOLOGICAL DIFFERENTIATION OF MUCINOUS ADENOCARCINOMA FROM COLITIS CYSTICA PROFUNDA. (E.) Capehart, R. J. and J. W. Graves. *J. Kans. Med. Soc.* 72(9):385 & 392, 1971.

10449 CROHN'S DISEASE OF THE COLON. (Ger.) Hartweg, H. (Univ. Inst. Roentgenol. Radiol., Basel, Switzerland) and H. Fahrlander. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4): 439-456, 1971.

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10451 DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF ACUTE ABDOMINAL DISEASE WITH PARTICULAR REFERENCE TO SUBACUTE RELAPSING APPENDICITIS. (Ger.) Scheibe, O. (Surg. Clin., Stuttgart, Germany). *Z. Allgemein Med.* 47(27):1385-1389, 1971.

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10453 AMYLOIDOSES. REPORT ON LOCALIZED AMYLOIDOSIS OF THE RECTUM. (Ger.) Nissel, W. (Gen. Polyclin., Vienna) and G. Schmidt. *Wien. Med. Wochenschr.* 121(41):721-727, 1971.

10454 ANALYSIS OF MANAGEMENT OF PATIENTS WITH SPASTIC COLITIS. (Pol.) Klucznik, R. (Dr. M. Pirogowa, Hosp., Lodz, Poland) and K. Markiewicz. *Wiad. Lek.* 24(18):1721-1727, 1971.

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NEWBORN. RADIOLOGIC DIAGNOSIS OF TOTAL MEGACOLON. (Fr.) Sauvegrain, J. (St. Vincent Paul Hosp., Paris), J. L. Mareschal and M. J. Batard. *J. Radiol. Electrol. Med. Nukl.* 52(10):559-568, 1971.

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10469 DIVERTICULAR DISEASE OF THE COLON. (E.) Colcock, B. P. (Lahey Clin. Found., Boston, Mass.). *Major Probl. Clin. Surg.* 11:1-135, 1971.

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10473 THE IMMEDIATE RESULTS OF THE SURGICAL TREATMENT OF CANCER OF THE LARGE INTESTINE AND RECTUM. (Rus.) Odenova, N. B. *Khirurgiia (Mosk.)* 47(8):72-77, 1971.

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10481 THE REMOTE RESULTS OF THE SURGICAL TREATMENT OF CANCER OF THE RECTUM. (Rus.) Aleksandrov, V. B., I. M. Militarev and A. M. Gofman. *Khirurgiia (Mosk.)* 47(8):77-81, 1971.

10482 CHANGES IN THE VOLUME OF CIRCULATING BLOOD AND ITS CONSTITUENTS FOLLOWING COLECTOMY. (Rus.) Brusilovskii, M. I. and A. M. Brandina. *Khirurgiia (Mosk.)* 47(9):96-99, 1971.

10483 TREATMENT OF ACUTE PARAPROCTITIS. (Rus.) Selivanov, V. I., K. D. Toskin, V. A. Taliev and I. K. Solop. *Khirurgiia (Mosk.)* 47(9):93-96, 1971.

10484 LATE RESULTS OF COLOMYOTOMY. (E.) Smith, A. N. (U. Edinburgh Dept. Clin. Surg., Scotland), V. Giannakos and S. Clarke. *J. R. Coll. Surg. Edinb.* 16(5):276-286, 1971.

10485 VILLOUS PAPILLOMATOSIS OF THE RECTUM. (Ger.) Bartsch, G. (U. Innsbruck Inst. Pathol. Anat., Austria) and H. Woll. *Med. Welt* 22(41):1583-1586, 1971.

10486 CANCER OF THE COLON IN NIGERIANS AND AMERICAN NEGROES. (E.) Adetayo Grillo, I. (Univ. Coll. Hosp., Ibadan, Nigeria), L. F. Bond and W. W. Ebong. *J. Natl. Med. Assoc.* 63(5): 357-361, 1971.

10487 RESULTS OF GRACILIS MUSCLE TRANSPOSITION FOR TREATMENT OF FECAL INCONTINENCE IN CHILDREN. (Pol.) Gizycka, I. (Med. Acad. Pediatr. Surg. Clin., Warsaw, Poland) and A. Romanowska. *Pol. Tyg. Lek.* 26(36):1393-1395, 1971.

10488 PNEUMATIC RUPTURE OF COLON. (E.) Kumar, R. (Bhilai Steel Plant Main Hosp., Bhilai, India), T. R. Rowe and P. B. Dave. *Postgrad. Med. J.* 47(551):631-632, 1971.

10489 THE CARCINOID TUMORS OF THE DIGESTIVE TRACT. (Fr.) Jouanneau, P. and M. Malafosse. *J. Chir. (Paris)* 102(3):243-254, 1971.

10490 BENIGN LESIONS OF THE RIGHT COLON. (E.) Lear, T. F. (1968 Peachtree Rd., Atlanta, Ga.), S. W. Gray, J. H. Milsap and J. E. Skandalakis. *J. Med. Assoc. Ga.* 60(8):271-275, 1971.

10491 IATROGENIC COLITIS DUE TO PURGATIVES. (Fr.) Anonymous. *Gaz. Med. Fr.* 78(34): 6019-6022, 1971.

10492 NONGANGRENOUS ISCHEMIC COLITIS: CLINICAL FEATURES AND RADIOLOGIC DIAGNOSIS. (Ger.) Hartel, M. (U. Bern Med. Clin., Switzerland), G. Egger, F. Halter and J. Laissue. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):432-439, 1971.

10493 THE VALUE OF LYMPHOANGIOADENOGRAPHY IN DIAGNOSING THE STAGE OF DEVELOPMENT OF RECTOCOLIC CANCER. (Rum.) Mandache, F. (Brincovenesc Hosp., Bucharest), D. Dragnev, M. Popescu and I. Curea. *Chirurgia (Bucur.)* 20(8): 749-754, 1971.

10494 SUBCUTANEOUS LATERAL INTERNAL ANAL SPHINCTEROTOMY FOR ANAL FISSURE. (E.) Millar, D. M. (Essex County Hosp., Colchester, England). *Br. J. Surg.* 58(10):737-739, 1971.

10495 ENTEROGENOUS CYSTS OF THE RECTUM COLITIS CYSTICA PROFUNDA. (E.) Talerman, A. (Inst. Radiother., Rotterdam, Netherlands). *Br. J. Surg.* 58(9):643-647, 1971.

10496 ILEOSTOMY AND COLOSTOMY CARE. (E.) Whelton, M. J. (Western Gen. Hosp., Edinburgh, Scotland), J. M. Findlay and M. A. MacDonald. *Br. J. Hosp. Med.* 6(3):315-322, 1971.

10497 COLON DUPLEX, A CORRECTABLE CAUSE OF CONSTIPATION. (E.) Goldman, S. M. (USPHS Phoenix Indian Med. Ctr., Ariz.) and R. C. Kreuzburg. *Ariz. Med.* 28(10):748-751, 1971.

10498 THE IRRITABLE COLON SYNDROME. A FOLLOW-UP STUDY WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF DIVERTICULA. (E.) Havia, T. (U. Turku Dept. Surg. Radiol., Finland) and R. Manner. *Acta Chir. Scand.* 137(6):569-572, 1971.

See also numbers: 10116, 10393

10499 FAMILIAL ASPECTS OF INFLAMMATORY BOWEL DISEASE. (E.) Singer, H. C. (U. Chicago Sch. Med., Ill.), J. G. D. Anderson, H. Frischer and J. B. Kirsner. *Gastroenterology* 61(4, Pt. 1):423-430, 1971.

The concept of a genetically-induced susceptibility to inflammatory bowel disease was examined by reviewing all cases seen at the University of Chicago between 1963 and 1969, and determining the incidence of familial disease in a matched series of affected and healthy individuals. Of the 646 patients who returned questionnaires, 113 (17.5%) provided documentable evidence of inflammatory bowel disease within their family. The incidence of this disease was 4% (6 of 150) in the control group and 11.3% (17 of 150) in the group randomly selected from the 646 affected individuals. Of the 113 patients 66 (58%) had "pure" ulcerative colitis, 16 (15%) had "pure" Crohn's disease, and 31 (27%) had both of these disorders. The most frequent familial distribution was 1 additional affected family member (84%), and most often involved a sibling or a parent-child combination. While familial and nonfamilial groups showed no significant differences with regard to sex, race, marital status, occupation, educational level, medical or surgical treatment, complications, or associated conditions, those individuals with a family history of inflammatory bowel disease were most likely to be Jewish and developed the disease in their second decade of life.

10500 THE OVERLAPPING SPECTRUM OF ULCERATIVE AND GRANULOMATOUS COLITIS: A ROENTGENOGRAPHIC-PATHOLOGIC STUDY. (E.) Margulis, A. R. (U. California Sch. Med., San Francisco), H. I. Goldberg, T. L. Lawson, C. K. Montgomery, O. N. Rambo, C. D. Noonan and J. R. Amberg. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 113(2):325-334, 1971.

The roentgenograms of 150 cases of colitis were classified as ulcerative in 76 cases, granulomatous in 60 and indeterminate colitis in 14 cases by 2 radiologists using 10 typical criteria. Two pathologists compared these roentgen findings by biopsy in 22 patients and colectomy and necropsy in 128 patients. Total colon involvement was noted in 41% of the patients with ulcerative colitis, 74% had concentric involvement, 96% involvement of the left colon and/or rectum, 80% had shallow ulcers and 42% had deep ulcers. The patients with granulomatous colitis demonstrated 23% total colon involvement, 22% concentric involvement, 77% left colon and/or rectum, 32% shallow ulcer, and 82% deep ulcer. The indeterminate, 14 cases, had 57% of total and concentric involvement, 100% left colon and/or rectum, 86% shallow ulcer, and 8% deep ulcer involvement. Enterocolic and ileocecal fistulae and intramural and peritoneal abscesses were found almost exclusively in granulomatous colitis. A gaping ileocecal value was more frequent in ulcerative colitis. The 150 cases were then reviewed by 3 gastrointestinal radiologists. Their unanimous opinion did not coincide with histological interpretation in 13 cases. The indeterminate cases were reclassified. Combined interpretation of clinician, radiologist, and pathologist is necessary in any case of colitis with atypical or overlapping features.

10501 ULCERATIVE COLITIS IN FEMALE MONOZYGOTIC TWINS AND A FEMALE SIBLING. (E.) Sleight, D. R. (U. Illinois Abraham Lincoln Sch. Med., Chicago), J. E. Galpin and R. E. Condon. *Gastroenterology* 61(4, Pt. 1):507-512, 1971.

An unusual family in which ulcerative colitis occurred in female monozygotic twins and in a nontwin female sibling is reported and the literature of ulcerative colitis in twins and in families is reviewed. There was no ancestral history of ulcerative colitis or of any disease exhibiting diarrhea, anemia, abdominal pain, or weight loss. Neither the parents nor two older nontwin brothers were affected. Various genetic and environmental factors which may be involved in the development of ulcerative colitis are discussed. The small number of monozygotic twins reported with ulcerative colitis seems to contradict a purely genetic basis for the disease. The ages of onset (20, 21 and 24) and sex of the affected siblings fit most closely a polygenic familial predisposition, possibly sex-linked, which requires a further genetic or environmental stimulus for expression.

10502 PORTAL VEIN GAS FOLLOWING BARIUM ENEMA EXAMINATION. (E.) Kees, C. J. (U. Mississippi Med. Ctr., Jackson) and C. L. Hestern, Jr. *Radiology* 102(3):525-526, 1972.

A case is presented of a 44-yr-old woman who presented with a 6-yr history of intermittent mucus and blood-streaked diarrhea associated with chills and fever. During the past yr she had a 10-pound weight loss and up to 8 bowel movements daily. A barium enema revealed the changes of ulcerative colitis but no hepatic portal venous gas was seen. Biopsy was confirmative. Combined barium enema and air-contrast examination 3 days after biopsy yielded the same findings and she was started on azulfidine in addition to the usual medical regimen. Repeat barium enema examination 3 and 10 months later showed overall radiographic improvement of the colon with some decrease in ulceration, and no gas was seen in the hepatic portal veins on either occasion. Another barium enema 1 yr later revealed a marked increase in activity as well as extensive ulceration and pseudopolyposis. The pre-evacuation films demonstrated no gas in the portal veins, but the post-evacuation study clearly revealed characteristic distribution of hepatic portal vein gas. No clinical or radiographic evidence of toxic megacolon was seen at any time nor was intramural gas seen on plain or barium enema films. Because her disease could not be controlled medically a total colectomy was performed. Three months after surgery she is doing well with some weight gain.

10503 LACTOSE INTOLERANCE IN JEWISH PATIENTS WITH ULCERATIVE COLITIS. (E.) Tandon, R., H. Mandell (Backus Hosp., Norwich, Conn.), H. M. Spiro and W. R. Thayer, Jr. *Am. J. Dig. Dis.* 16(9):845-848, 1971.

A possible reason for the high incidence of lactase deficiency found in Jewish patients with ulcerative colitis was suggested to be due to segregation of the genes for ulcerative colitis and lactase deficiency. Seventy patients with ulcerative colitis and 94 control subjects were studied. Lactose tolerance tests were done on 70 ulcerative colitis patients; of 51 non-Jewish patients, 12 (23.5%) had lactose intolerance; of 19 Jewish patients, 16 (84.2%) had lactose intolerance. A control group of 41 Jews without ulcerative colitis had 71% lactose intolerance, while 53 non-Jewish controls had 20.7% intolerance. For this study, lactose intolerance was defined as the failure of blood glucose level to rise more than 20 mg higher than the fasting level. In addition, studies should consider the ethnic and geographic origin of the patients. This might explain some of the differences of lactose intolerance reported among various groups.

10504 A COMPARISON OF THE ILEOSTOMY FUNCTION IN PATIENTS PROCTO-COLECTOMIZED FOR ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE COLON. (E.) Hultén, L. (Sahlgrenska Hosp., Goteborg, Sweden), C. Holm and J. Kewenter. *Acta Chir. Scand.* 137(7):689-691, 1971.

The average excretional volumes and electrolyte content of dejecta during the first 9-12 days after proctocolectomy in 9 patients with ulcerative colitis and in 6 with Crohn's disease was studied. The diagnosis had been established by rectal biopsy and subsequent histological examination after operation. On laparotomy the small intestine was free of gross lesions. None of the patients had received steroids. Twenty-four hr collections of ileostomy dejecta were made during the period of investigation. Ileostomy action of more than 100 ml of dejecta occurred on the second or third postoperative day with no remarkable difference between the 2 groups. There was no difference in the volume of the dejecta between the 2 groups during the study. The ileostomy discharge increased gradually until the fourth postoperative day then declined to about 650 ml in the colitis group and 950 ml in the Crohn group by the ninth postoperative day. The losses of sodium were directly proportional to the volume of the dejecta and did not vary between the groups. The loss of potassium per 24 hr varied considerably within each group but did not differ between the groups. The patients have been followed for at least a yr and ileostomy function has remained normal.

10505 IMMUNOLOGICAL ASPECTS OF ULCERATIVE COLITIS IN THE LIGHT OF PERSONAL INVESTIGATIONS. (E.) Bakowska, Z. (Med. Ctr. Postgrad. Educ., Warsaw, Poland). *Mat. Med. Pol.* 2(2-3):25-31, 1970.

10506 TOXIC COLON COMPLICATING ULCERATIVE COLITIS. REPORT OF 9 CASES. (Pol.) Narebski, J. (Med. Acad. Inst. Clin. Med., Warsaw, Poland) and K. Jakubowska. *Pol. Tyg. Lek.* 26(42):1625-1628, 1971.

10507 COLITIS, GRANULOMATOUS OR ULCERATIVE. (E.) Shallenberger, P. L. (Robert Packer Hosp., Sayre, Pa.), D. R. Weaver and G. Eisinger. *Guthrie Clin. Bull.* 41(2):73-81, 1971.

See also numbers: 9925, 10291, 10345

10508 PANCREATIC CALCIFICATIONS. (E.) Minagi, H. (U. California Sch. Med., San Francisco) and F. R. Margolin. *Am. J. Gastroenterol.* 57(2):139-145, 1972.

Pancreatic calcifications are present in up to 30% of the patients with chronic pancreatitis. Calcifications in the pancreas are nearly always multiple and vary from discrete calculi to multiple punctate or granular forms. Occasionally a solitary calculus may be found in a larger duct. Increase in extent is indicative of progressive disease. In pancreatitis, concretions are believed to be a result of inflammation caused primarily by precipitation. Among 677 patients with pancreatic calcification, pancreatic carcinoma was found in 24 (3.6%). Chronic irritation by calculous disease is postulated as a mechanism responsible for the malignant change. Pancreatic calcifications usually remain unchanged for long periods or may rarely disappear spontaneously or be associated with pseudocysts or malignancy. Calcifications within the pancreas have also been seen with tuberculosis and hyperparathyroidism and rarely with cystic fibrosis, hemochromatosis, infarction, hemorrhage, and hydatid disease. Of 370 patients with calcification 24% had diabetes and 19% had evidence of pancreatic exocrine insufficiency.

10509 ECHOGRAPHIC-RADIOLOGICAL DOCUMENTATION OF SPONTANEOUS RUPTURE OF A PANCREATIC PSEUDOCYST INTO THE DUODENUM. (E.) Leopold, G. R. (U. California-San Diego Sch. Med., La Jolla), R. N. Berk and R. T. Reinke. *Radiology* 102(3):699-700, 1972.

A single case is presented of a 35-yr-old female alcoholic admitted for the second time with severe epigastric pain radiating to the back following a 3-week period of heavy drinking. On examination there was marked epigastric tenderness and guarding, but no definite mass was palpated. She had fever, leukocytosis and an elevated serum amylase level, while an abdominal plain film revealed pancreatic calcification. During a week of nasogastric suction and i.v. feeding her laboratory studies were unaltered, but an epigastric fullness could be palpated. On the seventh hospital day, contact echography with a B-scan laminagraphic unit, made transversally and longitudinally at 2-cm intervals, was performed prior to barium studies. The initial echogram (a high-gain transverse scan 8 cm cephalad to the iliac crest) revealed a large, loculated anterior mass, which was clearly filled with fluid; an identical scan was seen after total aspiration of the stomach with a nasogastric tube. Two days later an upper gastrointestinal barium study revealed a large mass compressing the lesser curvature of the stomach and the duodenal bulb extrinsically. Later that day she felt markedly improved and the mass seemed decreased in size to palpation. Repeat echography 3 days later showed that the anterior fluid mass was no longer present and a barium study the next day revealed a broad fistulous tract from the apex of the duodenal bulb to a collapsed cavity along the lesser gastric curvature. She was discharged but was readmitted 1 week later with increasing left subscapular pain and the same laboratory studies. At laparotomy, a trilobed pseudocyst containing a moderate amount of sterile fluid was found and a cystojejunosotomy was constructed to promote drainage.

10510 SURGICAL CORRECTION OF FUNCTIONING ISLET CELL CARCINOMA OF THE PANCREAS ASSOCIATED WITH HYPERADRENOCORTICISM. (E.) Frederick, W. C. (St. Vincent's Med. Ctr., Richmond, N. Y.) and L. Gross. *Am. J. Gastroenterol.* 57(2):146-151, 1972.

A case of functioning islet cell carcinoma of the pancreas with clinical and laboratory evidence of adrenocortical hyperfunction in a 21-yr-old white male is presented. The patient entered the hospital with a 5-month history of dizziness, fainting spells, convulsions and low blood sugar levels. He had a "diabetic" glucose tolerance test, elevated plasma corticoids and Cushing-like facies. A clinical diagnosis of functioning islet cell adenoma was made. At surgery, a subtotal pancreatectomy and splenectomy was carried out. Blood glucose monitoring during surgery showed a rapid rise in blood sugar after removal of the tumor and indicated a single tumor. A 2.5-cm islet cell carcinoma was found in the tail of the pancreas. Postoperative course was uneventful. ACTH assays were not obtained, however, the normal plasma cortisol levels 2 weeks after surgery and the regression of the Cushing's features 3 months after surgery indicate that a substance similar to ACTH stimulated the adrenal cortex. It is possible that an imbalance between glucagon and insulin is responsible for the diabetic glucose tolerance curve that did not disappear with surgical removal of the tumor. The overproduction of growth hormone was not demonstrated.

10511 PANCREAS TRANSPLANTATION IN DOGS AND PANCREAS PRESERVATION BY FREEZING. (Ger.) Zimmermann, G. (Salzburg Hosp., Austria) and E. Hell. *Langenbecks Arch. Chir.* 328(4): 328-348, 1971.

Different types of anastomoses in intra-abdominal heterotopic duodenopancreatic allotransplants into the right iliac fossa were compared. End-to-side anastomosis between the portal vein of the transplant and inferior vena cava of the recipient was superior to the end-to-end anastomosis with the right common iliac vein of recipient, since the latter frequently resulted in thromboses and pancreatitis and a higher surgical mortality.

The end-to-end anastomosis to the right external iliac artery of recipient was definitely superior to anastomosis to the right renal artery. The average survival time of dogs without immunosuppressive therapy (excluding those dying during first 48 post-operative hr) was 11.1 days. Daily administration of 4 mg/kg azathioprine and 2 mg/kg prednisolone (10 recipients) markedly prolonged survival (average 28.1 days, longest 63 days) but 2 mg/kg/day of azathioprine and 1 mg/kg/day prednisolone only slightly increased survival (16 days). At autopsy, grafts showed signs of chronic rejection. Rejection caused a progressive loss of exocrine function resulting in severe weight loss and death, but the endocrine function was maintained in most animals until death. The endocrine function was also maintained to a certain degree in 6 of 12 organs which had been preserved by freezing at -60°C for 6-10-days prior to transplantation, but survival of the recipients was shorter than that of controls (less than 5 days). It is postulated that the rapid death of these recipients was due to the release of toxic substances from the preserved organ. The problems of pancreas transplantations in humans and of organ preservation by freezing are discussed.

10512 CARCINOMA ASSOCIATED WITH PANCREATIC CYST. (E.) Buck, B. A. (U. Oregon Med. Sch., Portland) and W. S. Fletcher. *Surg. Gynecol. Obstet.* 134(1):44-46, 1972.

Two patients were operated upon with a preoperative diagnosis of pancreatic pseudocyst. Although exploration and biopsy were performed, the presence of a neoplasm could not be proved at the initial operation. Both patients were found to have advanced metastatic carcinoma at subsequent laparotomy. Criteria which are helpful in evaluating a patient with pancreatic cyst is a proven history of recurrent pancreatitis with antecedent trauma or alcoholism pointing to a benign diagnosis. Severe abdominal and back pains, narcotic addiction and marked weight loss may occur in patients with either pseudocyst or carcinoma. The presence of jaundice markedly increases the index of suspicion for carcinoma. A negative pancreatic biopsy is of little differential value. If at operation a recognized tumor is not amenable to resectional therapy, biliary bypass and a positive diagnosis may save the patient a future surgical procedure.

10513 AETIOLOGICAL FACTORS IN PANCREATIC CALCIFICATION IN CEYLON. (E.) Nagaratnam, N. (Govt. Hosp., Gampaha, Ceylon) and K. R. W. Gunawardene. *Digestion* 5(1):9-16, 1972.

Pancreatic calcification was found in only 2 of 82 male alcoholic patients whose ages ranged from 35-66 yr. There were 5 with acute alcoholic hepatitis, 3 with cirrhosis and 70% with serum amylase levels above normal. In 12 randomly selected cases of diabetes, no history of marasmus or kwashiorkor in childhood was elicited. Pancreatic calcification was seen in 2 patients. Pancreatic calcification of a familial nature has been described; though not proven. There may be a genetic predisposition to pancreatic calcification in those with this abnormality.

10514 ANNULAR PANCREAS AND DUODENOSTASIS. (Rus.) Borovi, E. M. *Vestn. Khir.* 107(9):35-38, 1971.

10515 ECTOPIC PANCREATIC TISSUE IN THE AREA OF THE LEFT KIDNEY. (Ger.) Brinkmann, H. O. (Marien Hosp., Soest, Germany). *Urologe* 11(4):139-140, 1971.

10516 NON FUNCTIONAL ISLET CELL TUMOR OF THE PANCREAS. (Fr.) Gaboury, J. (Notre Dame Hosp., Montreal, Quebec, Canada), P. Daloze, M. Emond and R. Vauclair. *Union Med. Can.* 100(9): 1767-1770, 1971.

10517 CYSTIC FIBROSIS IN THE ADULT. REPORT OF A CASE. (Fr.) Gallet, M. (St. Joseph Hosp., Lyon, France), M. Tartulier and M. Lestaevel. *Lyon Med.* 225(9):845-857, 1971.

10518 CRITICAL STUDY OF THE VALUE OF THE BLOOD GLUCOSE AND AMYLASE TEST IN SCREENING OF PANCREATIC DISEASE. STUDY OF 595 CASES. (Fr.) Vermesse, G. (Cent. Hosp., Lens, France), J. Polaert and C. Gautier Benoit. *Lille Med.* 16(3):415-424, 1971.

10519 INHIBITION OF SUGAR TRANSPORT BY PLASMA FROM CYSTIC FIBROSIS PATIENTS. (E.) Brown, G. A. (U. Birmingham Inst. Child Health, England), A. Oshin, M. C. Goodchild and C. M. Anderson. *Lancet* 2(7725):639-640, 1971.

10520 IgA: PRESENCE IN MECONIUM OBTAINED FROM PATIENTS WITH CYSTIC FIBROSIS. (E.) Rule, A. H. (Boston Coll. Grad. Dept. Biol., Chestnut Hill, Mass.), D. Lawrence and H. J. Hager. *Pediatrics* 48(4):601-604, 1971.

10521 TOMO-ECHOGRAPHIC EXPLORATION OF THE PANCREAS. (Fr.) Weill, F. (CHU Radiol. Ctr., Besancon, France), J. Kraehenbuhl and J. P. Ricatte. *Presse Med.* 79(37):1641-1644, 1971.

10522 ACUTE NECROSIS OF PANCREAS FOLLOWING GASTRIC RESECTION DUE TO OBSTRUCTION OF THE ORIFICE OF THE PANCREATIC DUCT BY AN ASCARID. (Rus.) Borovii, E. M., L. N. Nesterenko and V. M. Bas. *Klin. Khir.* 51(7):71-72, 1971.

10523 PRIMARY SPINDLE CELL SARCOMAS OF THE PANCREAS. REPORT OF TWO CASES. (Fr.) Godquin, B. (63 Promenade de la Croisette, Cannes, France) and Y. Salembier. *J. Chir. (Paris)* 102(3):217-226, 1971.

10524 DISAPPOINTING RESULTS IN ANGIOGRAPHIC EXPLORATION OF THE PANCREAS. (Dut.) Van Voorthuisen, A. E. (Acad. Ziekenh., Hosp., Leiden, Netherlands). *J. Belge Radiol.* 54(5): 621-627, 1971.

10525 RADIOLOGIC STUDY OF PANCREATIC DISEASE IN THE ADULT. (E.) Rizk, G. K. (American U. Med. Ctr., Beirut, Lebanon) and Z. L. Deeb. *J. Med. Liban.* 24(4):367-380, 1971.

10526 PANCREATIC DISEASE IN DOGS AND CATS. (E.) Anderson, N. V. (Kansas State U., Coll. Vet. Med., Manhattan) and A. C. Strafuss. *J. Am. Vet. Med. Assoc.* 159(7):885-891, 1971.

10527 DIAGNOSIS AND TREATMENT OF BENIGN TUMORS OF THE PANCREAS. (Ger.) Voßschulte, K. (Univ. Surg. Clin., Giessen, Germany), F. X. Sailer and K. Schultis. *Dtsch. Med. Wochenschr.* 96(37):1461-1466, 1971.

10528 HYDATID CYST WITH CAUDAL PANCREATIC LOCALIZATION. (Rum.) Cristian, V. (Judetean Hosp., Sibiu, Rumania) and G. Telea. *Chirurgia (Bucur.)* 20(4):379-381, 1971.

10529 THE OPERATIVE DIAGNOSIS OF CARCINOMA OF THE PANCREAS. (E.) Trapnell, J. (Roy. Victoria Hosp., Bournemouth, England). *Br. J. Surg.* 58(11):849-851, 1971.

10530 CARCINOID OF THE PANCREAS. (E.) Gordon, D. L. (Mt. Sinai Hosp. Med. Ctr., Chicago, Ill.), M. Chang Lo and M. A. Schwartz. *Am. J. Med.* 51(3):412-415, 1971.

See also numbers: 10134, 10149, 10154, 10649

PANCREATITIS

10531 ACUTE PANCREATITIS. AN APPRAISAL OF 42 CASES. (E.) Bhansali, S. K. (Topiwala Natl. Med. Coll., Bombay, India) and C. K. Deshpande. *Am. J. Gastroenterol.* 57(2):152-165, 1972.

Among the 42 cases of acute pancreatitis are etiologies of acute and recurrent acute pancreatitis, postoperative pancreatitis, pancreatitis with duodenal ulcer, and parathyroid disease. Seventeen of 42 cases died (40%), 13 of them within 48 hr of hospitalization mainly due to toxemia. Only 3 of the 24 cases managed medically died, in contrast to 7 of 12 who received surgical treatment. Among the 7 fatal cases operated on, 4 had normal or equivocal serum amylase levels due to fulminating disease. In patients past the age of 40 (22 cases), the mortality was 50%, in patients below 40 (20 cases) the mortality was 30%. Nine of 15 patients with toxemia died, and 10 of 19 patients with paralytic ileus died. The 2 patients with postoperative pancreatitis died. In this study, 9 of 13 autopsied cases had grossly hemorrhagic pancreatitis. Of the 25 survivors, 16 were followed from 3 months to 5 yr. Recurrent pancreatitis was evident in 5 cases and required emergency care. Four patients required supplements of enzyme for steatorrhea and 3 patients developed persistent hyperglycemia.

10532 EMERGENCY PANCREATECTOMY FOR ACUTE PANCREATITIS. (A PERSONAL STATISTICAL STUDY BASED ON 17 CASES). (E.) Hollender, L. F. (Univ. Hosp. Ctr., Strasbourg, France), M. Gillet and J. J. Kohler. *Chir. Gastroenterol.* 5(3): 346-360, 1971.

The authors have presented their results of emergency partial pancreatectomy for 11 cases of acute primary pancreatitis and in 6 cases of acute postoperative pancreatitis. Of the 17 cases treated with pancreatectomy there were 6 deaths, which is comparable to the high mortality rate previously reported. From 1957 to 1968, the authors treated 38 of 83 cases of acute pancreatitis by operation i.e. exploratory laparotomy or drainage. Twelve of the 38 patients had an edematous form and there were 2 deaths. Necrotic and hemorrhagic forms were found in 26 patients with 21 deaths. From a comparison of these earlier results the author favors operation with pancreatectomy. It is felt that early and extensive pancreatectomy is necessary to reduce the mortality. Surgery should be performed only in cases where necrotic-hemorrhagic lesions are undeniable. In doubtful cases the authors would prefer to re-operate. The ideal time for surgery seems to be between the first and third day of the evolution of acute necrotic-hemorrhagic pancreatitis at a time when medical treatment has failed and complications have not appeared.

10533 HYDROLYSIS OF A WATER INSOLUBLE SUBSTRATE INCORPORATED INTO SOLIDIFIED AGAR MEDIUM BY ENZYME α-AMYLASE CONTAINED IN SERUM AND URINE OF PATIENTS SUFFERING FROM ACUTE PANCREATITIS. (E.) Ceska, M. (Pharmacia AB, Uppsala, Sweden). *Clin. Chim. Acta* 36(2):463-471, 1972.

Water-insoluble blue starch polymer incorporated into solidified agar medium forms a synthetic substrate for the enzyme, α-amylase. The substrate was hydrolyzed by serum and urine samples from patients suffering from acute pancreatitis; an easily measured transparent circular urea was formed when the enzyme present in the sample diffused through the solidified medium. The transparent circular area increased with increasing time and temperature of incubation, and the growth rate of these areas was higher in patients with acute pancreatitis than in controls. The diameter of the transparent circular areas decreased linearly with increasing dilution of sample. Advantages of this method of determining enzyme activities are that the enzyme does not need to function under substrate saturation conditions and it is unnecessary to dilute samples from patients suffering from acute pancreatitis.

10534 THE USE OF ECHOTOMOGRAPHY IN EXPLORING THE PANCREAS. (Fr.) Weill, F. (Univ. Hosp. Ctr., Besancon, France), J. Becker, J. Kraehenbuhl, J.-P. Ricatte, H. Kasozi and N. Prevotat. *Ann. Radiol. (Paris)* 14(9-10):735-746, 1971.

A discussion concludes that pancreatic cysts and pseudocysts are clearly demonstrable by echotomography, although pancreatitis is difficult to diagnose, in the absence of considerable swelling.

10535 ACUTE PANCREATITIS. (E.) Geokas, M. C. (U. California Sch. Med., Los Angeles), J. L. Van Lancker, B. M. Kadell and H. I. Machleder. *Ann. Intern. Med.* 76(1):105-117, 1972.

Two types of acute pancreatitis have been recognized: the edematous or interstitial and the hemorrhagic or necrotic. The leading causes of acute pancreatitis are alcoholism, biliary tract disease and trauma; hyperparathyroidism, familial hyperlipemia, drugs, and hereditary pancreatitis account for a few cases. Autodigestion of pancreatic tissue by released enzymes is the most plausible pathogenesis for tissue injury. Peculiar characteristics of pancreatic inflammation are fat necrosis, hemorrhagic necrosis and glassy edema. X-ray examination of the chest and abdomen is helpful in diagnosis, but elevated serum amylase is the most important diagnostic feature. Serum methalbumin is helpful in differentiating the edematous from the hemorrhagic form. A poor prognostic sign in acute pancreatitis is pronounced, persistent hypocalcemia which may reflect calcium soap formation and the release of glucagon and thyrocalcitonin. Peritoneal lavage may now be used with infusion of crystalloids, colloids, analgesics and nasogastric suction in hemorrhagic pancreatitis.

10536 THE SURGICAL SIGNIFICANCE OF METHAEMALBUMINAEMIA. (E.) Battersby, C. (U. Queensland Dept. Surg., Brisbane, Australia) and M. K. Green. *Gut* 12(12):995-1000, 1971.

The levels of methemalbumin in plasma were measured in surgical states other than pancreatitis where hemoglobin might be expected to be exposed to proteolytic enzymes, and the results were compared with those in a control group, and with a group with acute pancreatitis. In 80 control subjects, the highest methemalbumin level was 5.5 with a mean of 2.02 mg/100 ml. Amylase levels in all patients were under 250 Somogyi units and haptoglobin was present in all subjects. Of 130 patients with abdominal pain, only 3 had elevated levels of methemalbumin, serum amylase was not elevated in any and haptoglobins were present in all except one in whom the level of methemalbumin was not raised. Abnormal levels of methemalbumin were found in 8 of 60 cases of trauma. In all of the patients with abnormal levels of methemalbumin, serum amylase was below 250 Somogyi units. Elevated plasma levels of methemalbumin were found in 5 of 21 patients with pancreatitis.

10537 PATHOGENESIS OF STEROID-INDUCED PANCREATITIS. HISTOLOGIC, ENZYME-HISTOCHEMICAL AND ELECTRON-MICROSCOPIC STUDIES IN RAT PANCREAS. (Ger.) Putzke, H.-P. (U. Rostock Inst. Gen. Spec. Pathol., Germany). *Exp. Pathol.* 5(5/6):334-343, 1971.

Following p.o. administration of prednisone (10 mg/day for 5-10 days, by gastric gavage), 3 of 10 male rats developed focal pancreatitis, 1 of 10 developed generalized pancreatitis. The disorder, which involved the parenchyma, consisted primarily of dystrophic changes of the acini, accompanied by a reactive inflammatory process, chiefly affecting the histiocytes. It is concluded that the steroid induced primary lesions of the parenchyma of the exocrine pancreas, and especially of the acinar cells of the epithelium, is due to a disturbance of protein metabolism and consequent inhibition of specific protein synthesis.

10538 ACUTE PANCREATITIS OF BILIARY ORIGIN. DIAGNOSTIC AND THERAPEUTIC MEASURES BASED ON FOURTEEN CASES. (Fr.) Vankemmel, M. (City Hosp., Lille, France) and G. Lagache. *Lille Chir.* 26(3):151-164, 1971.

Among 61 cases of acute pancreatitis, 28 were attributed to alcoholism (10 of 28 were fatal), 14 to cholostasis and stenosis of the Sphincter of Oddi (8 of 14 fatal), 5 to gastroduodenal disorders (1 of 5, fatal), 2 to trauma (none fatal), 4 to postoperative complications (no details; 3 of 4, fatal) and 8 to unknown causes (2 of 8, fatal). Deceased were 3 of 22 patients with edematous pancreatitis; 21 of 39 with necrotic-hemorrhagic pancreatitis. Among the 14 patients with acute pancreatitis of biliary origin, 5 of the 8 mortalities were in patients with the necrotic-hemorrhagic form of the disease. Only 2 of 7 patients in this category survived surgery, as contrasted to 4 of 7 with the edematous form of the disorder. In all 6 survivors, prompt surgical intervention included cholecystectomy and postoperative drainage of the common bile duct, accompanied by aspiration of edematous fluid from the pancreas and eradication of all hemorrhagic or necrotic lesions. The combination is believed to be the best for the treatment of any pancreatitis which appears to be primarily of biliary origin.

10539 X-RAY THERAPY OF ACUTE PANCREATITIS. (Cz.) Wachtfeidl, V. (OUNZ Dept, Surg., Karlovy Vary, Czechoslovakia) and M. Vitez. *Cesk. Radiol.* 25(4):145-152, 1971.

10540 EFFECT OF VASOPRESSIN IN THE TREATMENT OF EXPERIMENTAL ACUTE PANCREATITIS. (Sp.) Ferreira, J. A. *Bol. Soc. Argent. Cir.* 32(4):110-111, 1971.

10541 DIABETIC RETINOPATHY IN CHRONIC PANCREATITIS. (E.) Sevel, D. (U. Cape Town Dept. Ophthalmol., South Africa), J. H. Bristow and S. Bank. *Arch. Ophthalmol.* 86(3): 245-250, 1971.

10542 PROTEIN METABOLISM IN PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Iakhontova, O. I., L. N. Valenkevich and A. N. Kulikova. *Sov. Med.* 34(7):85-89, 1971.

10543 SEGMENTAL PORTAL HYPERTENSION IN THE COURSE OF CHRONIC PANCREATITIS. (MEDICAL ASPECTS). (Fr.) Paris, J., A. Gerard and J. C. Paris. *Lille Med.* 16(7):923-927, 1971.

10544 PANCREATECTOMY IN ACUTE PANCREATITIS. (Ger.) Grozinger, K. H. (City Hosp., Leverkusen, Germany). *Langenbecks Arch. Chir.* 328(4):311-313, 1971.

10545 ENZYME-INDUCED CHOLECYSTOCHOLANGIO-PANCREATITIS. (Rus.) Krakovskii, A. I. and Z. A. Samodumova. *Khirurgiia (Mosk.)* 47(7): 64-70, 1971.

10546 LACTIC DEHYDROGENASE ISOENZYMES IN THE DIAGNOSIS OF ACUTE PANCREATITIS. (Rus.) Khvatova, E. A. *Klin. Khir.* 51(7):11-15, 1971.

10547 TACTICS IN ACUTE NECROSIS OF PANCREAS. (Rus.) Kulchinskii, P. E., S. I. Maslov and G. S. Reshetov. *Klin. Khir.* 51(7): 7-11, 1971.

10548 X-RAY THERAPY IN ACUTE PANCREATITIS. (Rus.) Vakhtfeidl, V. (Karlovy Vary Hosp., Czechoslovakia) and M. Vitez. *Khirurgiia (Mosk.)* 47(10):25-27, 1971.

10549 PANCREATITIS IN OPERATIONS ON THE STOMACH AND BILIARY TRACT. (Ger.) Maurer, W. (Forchheim City Hosp., Germany) and E. Brug. *Munch. Med. Wochenschr.* 113(38):1220-1225, 1971.

10550 INDICATIONS FOR ARTERIOGRAPHY OF THE CELIAC AND MESENTERIC ARTERIES IN PANCREATITIS. (Fr.) Lemaitre, G. (City Hosp., Lille, France), C. L'Hermine, J. P. Maillard and A. Rembert. *J. Belge Radiol.* 54(5):629-634, 1971.

10551 PHOSPHOLIPID METABOLISMS IN PANCREATITIS: EFFECTS OF CDP CHOLINE ON PHOSPHOLIPASE A. (Jap.) Hashihira, S. (Osaka U. Sch. Med., Japan), R. Mori and Y. Takeda. *Jap. J. Clin. Med.* 29(5):1408-1419, 1971.

See also numbers: 10003, 10338, 10716, 10766, 10776

10552 THE VALUE OF SPLENOPORTOGRAPHY IN RESECTION OF THE LIVER. (E.) Trenti, A. (U. Rome Inst. Surg., Pathol.), L. Gioffrè and F. Bracci. *Chir. Gastroenterol.* 5(3):332-345, 1971.

A report on 280 cases of splenoportography in which the normal picture and variations are shown. Certain considerations should be kept in mind when splenoportographies are performed in patients with portal hypertension with a hepatic block. The liver being reduced in volume on the left, reflux filling, and the tangling of numerous branches makes identification difficult. Branches that run from the front to the back obliquely are difficult to identify. Among the many anatomic variations discussed was the subdivision of the vena portal into a right and left bifurcation in 73% of the cases, into a trifurcation in 20%, a quadrifuraction in 0.5%, an absence of the left branch in 2.8%, and a right segmentary branch originating from the left vena porta in 2.8%. One should also bear in mind other anomalies.

10553 LACTULOSE IN THE PROPHYLACTIC TREATMENT OF ENCEPHALOPATHY AFTER OPERATION FOR PORTO-SYSTEMIC DERIVATION. (E.) Ferrarese, S. (U. Bari Inst. Surg. Pathol., Italy), M. De Palma, T. Berardi and C. De Vanna. *Chir. Gastroenterol.* 5(3):375-388, 1971.

Lactulose may be used to suppress the proteolytic flora of the colon and cause a lower production of ammonia and other metabolites without the widespread destruction of other microorganism as is seen when antibiotics are used. The author discusses the relative merits of neomycin and colimycin. Lactulose was administered in the immediate postoperative period to 7 patients treated with portocaval anastomosis for portal hypertension. Clinical and hematologic finding were then compared with those in 20 other patients who underwent portacaval anastomosis. Lactulose produced more rapid canalization (second or third day) and resulted in blood ammonia levels of 0.4-0.6 γ/ml as compared to values of 1.05 µ/ml in the controls. Oral feedings on the fifth to sixth day did not produce any significant variation in ammonia levels and no encephalopathy was noted in the cases even at 3-4 weeks with a 60-80 g protein diet. No significant side effects were observed except for 1 case of diarrhea which responded to lowered doses of lactulose. These results suggest its use in the preoperative period also.

10554 POLYCYSTIC DISEASE OF KIDNEYS AND LIVER PRESENTING IN CHILDHOOD. (E.) Blyth, H. (Roy. Infirm., Stoke-on-Trent, England) and B. G. Ockenden. *J. Med. Genet.* 8(3):257-284, 1971.

Twenty-five children representing 20 families were classified into 4 groups on the basis of pathological presentation. The 4 groups were contiguous for age of presentation, liver and kidney involvement, and progress. Genetic studies of the families revealed no overlap of the 4 types within any 1 family. The 4 groups, i.e. the perinatal, neonatal, infantile, and juvenile types presented with decreasing amounts of renal tubule dilation and increasing periportal fibrosis as age increased. All age groups had bile ducts infolded and dilated. The older age presentation had survivors although portal hypertension was severe. An autosomal recessive inheritance with a different mutant gene for each group was indicated through genetic studies. Adult polycystic disease is contrasted to the childhood form. A single autosomal dominant gene with incomplete penetrance is noted in the adult type.

10555 HEPATOCELLULAR CARCINOMA, POSITIVE AUSTRALIA (HEPATITIS-ASSOCIATED) ANTIGEN AND SARCOIDOSIS. (E.) Myerson, R. M. (Philadelphia VA Hosp., Pa.), A. Soroush and P. V. Skerrett. *Am. J. Dig. Dis.* 16(9):857-862, 1971.

A 49-yr-old black man died of malignant hepatoma of the hepatocellular type on April 30, 1970. Past history included a diagnosis of sarcoidosis in 1947; uveitis, treated with adrenocorticosteroids in 1957; laparotomy in 1966 with removal of 2 feet of gangrenous small intestine believed due to mesenteric venous obstruction secondary to sarcoidosis. At surgery in 1966 the liver was noted to be nodular but no biopsy was taken. One pint of blood was given. In February, 1970 the patient was admitted with abdominal pain and marked hepatomegaly. Laboratory studies showed increased enzyme levels, elevated immunoglobulins, and positive Australian (Au) antigen and alpha-fetoprotein. Percutaneous needle biopsy revealed a malignant hepatoma. At autopsy a 10-cm tumor mass was in the right lobe and scattered nodules were present throughout the liver. No evidence of extrahepatic neoplasm or sarcoidosis was present. Ascites was positive for Au antigen. Hyalinization of lymph nodes suggested burnt-out sarcoidosis. Persistent Au antigenemia associated with an altered immune state is suggested. Sarcoidosis may have rendered the liver more vulnerable to carcinogenic stimuli.

10556 MEDIAN STERNOTOMY EXTENSION OF ABDOMINAL INCISION FOR HEPATIC LOBECTOMY. (E.) Miller, D. R. (U. Kansas Sch. Med., Kansas City). *Ann. Surg.* 175(2):193-196, 1972.

The median sternotomy extension has the following advantages over the commonly employed anterior-lateral thoracotomy: (1) the incision can be quickly made, with minimal blood loss, using the Sarns sternal saw and is readily closed, (2) the short incision in the more tendinous portion minimizes functional impairment of the diaphragm and avoids division of phrenic nerve branches, muscular fibers, blood vessels, and provides a strong closure, (3) the short distance between the skin and the cava gives a more direct visualization of the cava and hepatic veins for easy exposure of the bare area of the liver, (4) quick and easy access to the intrapericardial inferior vena cava for careful tape passage and to the right atrium for the use of an internal caval shunt is possible, (5) there is wide exposure of the entire liver, its attachments, and subphrenic spaces, (6) the liver can be partially displaced to aid in dissection and for precise control of the transection with minimum caval torsion, (7) the median sternotomy is well tolerated and usually associated with less pain and respiratory impairment in the recovery period. A description of the procedure in a 30-yr-old woman with an hepatocellular carcinoma of the right lobe is discussed.

10557 FUNCTIONAL TISSUE ENZYMOLOGY OF LIVER LYSOSOMES AND ITS USE IN THE EARLY DIAGNOSIS OF LIVER CELL LESIONS. (Fr.) Gabrielescu, E. (Inst. Norm. Pathol. Physiol., Bucharest, Rumania). *Ann. Histochem.* 16(3):183-193, 1971.

A histochemical method based on the staining of acid phosphatase with lead nitrate, was used to study changes in the permeability of liver lysosomes to sodium glycerophosphate. The results obtained on serial sections made from liver biopsies of 44 patients show that lysosomes were relatively stable and little acid phosphatase was found outside of the lysosomes in normal liver, even after long periods of incubation. In biopsies from patients with clinical symptoms of chronic hepatitis or cirrhosis lysosomes were more permeable to sodium glycerophosphate and acid phosphatase stained as faint granules in the hepatocytes and Küpffer cells after 5-15 min of incubation. After 30 min a larger number of acid phosphatase granules were present and these granules had diffused into the cytoplasm. After 60 min this enzyme had diffused throughout all of the cytoplasm in hepatocytes and in many Kupffer cells. Negative reactions were found in sections with histologic evidence of cellular necrosis, lysis, pigmentation, and fatty degeneration. Positive reactions were most often obtained in edematous hepatocytes with clear cytoplasm and excessive lysosomal activation associated with pigment transport. Periportal areas in contact with inflammatory infiltrates and bands of connective tissue were most often affected. On the basis of these results, this method is recommended for the early diagnosis of liver disease.

10558 SEGMENTAL ATROPHY OF THE LIVER CAUSED BY INTRAHEPATIC THROMBOSIS OF THE PORTAL VEIN. (Ger.) Kobylinski, S. (Karl Marx U. Pathol. Inst., Leipzig, Germany). *Zentralbl. Allg. Pathol.* 114(4):418-425, 1971.

Autopsy findings on a 68-yr-old man who died of cor pulmonale included intrahepatic obliteration of the portal vein with connective tissue associated with an unusual progressive atrophy of the right anterior segment of the liver. The patient also had chronic cholecystitis and cholangitis caused by a large stone in the gallbladder and extensive fibrous obliteration of small arteries and arterioles which resembled hypertensive vascular disease most often found in the kidney. It is considered likely that chronic biliary disease resulted in obliteration of the portal vein and that the hypoxia caused by this obliteration prevented liver cell regeneration.

10559 RECURRENT FAMILIAL INTRAHEPATIC CHOLESTASIS DATING BACK TO EARLY INFANCY. (Ger.) Rotthauwe, H. W. (Univ. Pediatr. Clin., Bonn, Germany) and I. Rotthauwe. *Z. Kinderheilkd.* 110(4):292-316, 1971.

A brother and sister, born of healthy parents, developed a rare form of intrahepatic cholestasis. Several of the mother's relatives had a history of adult liver disease. In the girl onset was marked by loose stools and growth retardation; jaundice first developed at age 10 months. The boy developed neonatal jaundice when he was 2 weeks old. Both children have had 5 episodes of jaundice each which lasted from 3 weeks to 5 months in the girl and from 2-9 months in her brother. Except for the first episode in the boy, jaundice was accompanied by severe pruritus. The maximum serum bilirubin levels in both children were 13.9 mg/100 ml; serum bile acids were increased during jaundice while serum cholesterol levels were only slightly increased. The girl had pronounced hypocalcemia until age 2 yr but only slightly increased serum transaminase activities in all episodes of jaundice; her brother did have abnormally high serum transaminase activities during early infancy. Liver biopsies were consistent with neonatal hepatitis during the boy's first episode of jaundice; all other biopsies revealed the presence of centrilobular cholestasis, but neither patient developed fibrosis or cirrhosis. Neither patient responded to corticosteroids; cholecystyramine alleviated the pruritus but failed to prevent recurrences of jaundice. It is considered that this form of jaundice is caused by an inherited metabolic disturbance, but it is not known whether the recurrent cholestatic jaundice observed in this brother and sister is a separate disease entity or a variant of known forms of cholestasis.

10560 DISTRIBUTION OF BILE LIPIDS IN NORMAL SUBJECTS AND IN CIRRHOSIS, FATTY LIVER, AND CHOLECYSTITIS. (Ger.) Erb, W. (Johann Wolfgang Goethe U. Intern. Med. Ctr., Frankfurt am Main, Germany) and S. Kautzsch. *Z. Gastroenterol.* 9(6):447-460, 1971.

Lipid determinations were made on gallbladder bile from 9 cadavers with no evidence of hepatobiliary disease; 2 with postnecrotic cirrhosis; 4 with fatty liver associated, in 1 case, with intrahepatic cholestasis and severe jaundice; and 8 with cholecystolithiasis, associated in 7 cases with cholecystitis. In normal gallbladder bile the mean total lipid content was 25.5 mg/g and consisted of 73% phospholipids, 12.1% sterols, 6.1% sterol esters, 5.5% free fatty acids, and 2.0% triglycerides. In both cirrhosis and fatty liver, phospholipids were decreased with a proportional increase in nonphospholipids; free fatty acids were increased and free sterols decreased. In both diseases the decrease in phospholipids is attributed to reduced bile acid secretion. In cholecystitis phospholipids were decreased by 8% and sterol esters doubled. Samples of liver bile were taken from 7 patients with cholelithiasis, 5 of whom had chronic cholecystitis and/or cholangitis and 2 of whom had acute cholecystitis, 1 and 8 days after cholecystectomy and bile duct drainage. At first liver bile from the 2 patients with acute cholecystitis contained almost no phospholipid; sterol esters were increased while free sterols were decreased. Changes occurring in liver bile from patients with chronic cholecystitis were less marked. Decreases in phospholipids are considered to be a result of surgery while the other changes are attributed to regression of inflammation.

10561 OSSEOUS CHANGES IN WILSON'S DISEASE. A RADIOLOGIC STUDY OF NINE PATIENTS. (E.)

Aksoy, M. (Istanbul Med. Sch., Capa), N. Camli, K. Dinçol, Ş. Erdem and T. Akgün. *Radiology* 102(3):505-509, 1972.

Subjects consisted of 9 patients with Wilson's disease, including 2 groups of siblings (2 per group). Radiographic studies of the skull (lateral view), elbows, knees and hands were made in 7 and of the pelvis, spine and feet in 6. Characteristic bone abnormalities of varying degree were seen in 7. Osteochondritis dessicans and subchondral changes were seen in the knees of 3 (including 1 group of sibs, in whom they were the cause of initial complaints) and in the spine of 1. Marginal bone fragmentation was seen in the epiphyseal region of the wrists in 3 (including the same 2 sibs and one of the other group), and again in the same groups of sibs in the third and fifth lumbar and twelfth dorsal vertebrae. This was most common in the wrists and hands, but was also seen in the elbows, shoulders and knees. Multilocular cysts in the distal metaphyses of the right femur were seen in 1 of the first group of sibs and a microcyst was seen on the proximal epiphysis of the tibia in his brother. Cystic changes were usually noted in the small joints. Mild or moderate osteopenia of the wrists was seen in all but 2. Only 1 patient revealed a generalized demineralization due to renal rickets and osteomalacia, and he also had a Milkman pseudofracture on the inner side of the left collum femoris. Mild osteopenia related to rickets was seen in 3 and epiphysiolysis capitis femoris in 1. Microsellae were detected in 2 males (7 X 6 mm and 8 X 8 mm with normal of 11-13 X 9-11 mm). Among the sibs, bone lesions were generally of the same type and were acquired at the same age.

10562 SOME NEW SURGICAL METHODS IN THE TREATMENT OF PORTAL HYPERTENSION. (E.)

van Ackeren, H. (Marien Hosp., Hamburg, Germany), T. Georgi, W. Koch, M. Rehner and H. W. Schreiber. *Chir. Gastroenterol.* 5(3):361-374, 1971.

The surgery of portal hypertension includes more than 50 operative methods and may be briefly divided into the classic shunt operation in which the definite relief of the whole blocked portal vein is obtained and into operations that do a selective decompression. Conditions in prehepatic and presinusoidal blocks are rather well defined in terms of treatment, but conditions in postsinusoidal hypertension of cirrhosis are harder to define. The exact etiology of portal hypertension in cirrhosis is not explained by mechanical reasons alone and may involve a defect in the methylation of epinephrine. Individual prognosis is often difficult in cirrhosis and some problems contraindicate operative procedures. Methods which attempt to circumvent some of these problems include arterialization of the portal vein, central splenorenal anastomosis, submucous transection of the esophagus and subcardial dissection of the stomach, intrapleural transposition of the spleen, gastroesophageal decongestion, and cervical lymphovenous anastomoses. The specific advantages and disadvantages of each method is discussed.

10563 THE CORRELATION BETWEEN LAPAROSCOPIC AND GAMMAGRAPHIC STUDIES OF THE LIVER.

(Sp.) Aguilar Reina, J. (Social Security City Sanit., Seville, Spain), F. Andreu Kern, J. De La Santa, A. Velloso, J. Carneado, A. Crespo Diez, M. G. De La Resilla and B. Rodriguez de Quesada. *Rev. Esp. Enferm. Apar. Dig.* 35(5): 549-554, 1971.

Gammagraphic (liver scans) and laparoscopic findings were compared to 150 patients, and the subsequently confirmed diagnoses listed for patients with each of 5 types of gammagraphic record which are illustrated by photographs. Positive correlation was of the order of 53% for normal or moderately disordered livers, with gammagraphy failing to distinguish between normal livers and those affected with moderate fibrosis or steatosis, incipient cirrhosis or chronic hepatitis. The correlation was of the order of 84% with respect to the presence of diffuse, destructive lesions; 85% for the presence of such lesions plus evidence of cirrhosis; 93% for the presence of space-taking lesions; 79% for the presence of both destructive and space-taking lesions, with or without concurrent cirrhosis. Even when the technique confirmed the presence of lesions successfully, it yielded no additional information of differential diagnostic value.

10564 GASTROSCOPIC FINDINGS IN PATIENTS WITH LIVER DISORDERS. (Ger.) Schmid, E. (Med. Acad., Lubeck, Germany) and H. Henning. *Z. Gastroenterol.* 9(5):353-356 & XIII, 1971.

Esophagoscopic examination showed single or multiple, sharply delineated, small red spots in the mucosa of the corpus and fornix in 124 of 250 patients with liver disorders (180 of 250, cirrhosis; 38 of 250, fatty degeneration; 32 of 250, incomplete degeneration). Single or multiple foci of hemorrhagic erosion of the mucosa were also seen in 44 of 124. In a correlative study, similar red spots were demonstrated in 36 of 50 patients with liver disorders and portal hypertension (40 of 50, cirrhosis; 7 of 50, fatty degeneration or chronic hepatitis; 3 of 50, hepatic cancer). They appeared to be especially diffuse in 2 patients with liver metastases from unknown primaries and 1 with a primary carcinoma of the liver. A similar phenomenon was observed in 5 patients in a control group of unspecified size, including 1 with a nonmetastasizing carcinoma of the papilla of Vater, 2 with right cardiac insufficiency and 2 with no apparent disorder.

10565 CYTOLOGICAL EXAMINATION AS AN ADJUNCT TO LIVER BIOPSY IN THE DIAGNOSIS OF HEPATIC METASTASES. (E.) Grossman, E., M. J. Goldstein, L. G. Koss, S. J. Winawer and P. Sherlock (Mem. Hosp., New York, N. Y.). *Gastroenterology* 62(1):56-60, 1972.

The usefulness of cytology as an adjunct to 2 percutaneous biopsies in increasing the diagnostic accuracy in metastatic cancer of the liver was studied in 39 cases. Cancer diagnosis was made in 16 of the 39 cases (41%) on one histological specimen, 21 of 39 cases (54%) when both histological specimens and 27 of 39 cases (69%) when histological and cytological techniques were applied to both percutaneous biopsies. There were 6 cases of the group of 39 proven cases of metastatic tumor (15%) in whom both histological specimens were negative for tumor, but 1 or both of the cytologic specimens were positive. In 4 additional patients, cytology revealed cancer but no definitive hepatic tumor was found at autopsy; however, in these 4 cases, the right pleura, diaphragm, right lung and/or peritoneum revealed cancer at the time of postmortem examination. There was not a single instance of erroneous cytological diagnosis of cancer. Thus, the use of the cytology technique and the second liver biopsy through the same skin site significantly increases the diagnostic yield in metastatic cancer of the liver.

10566 LIVER BIOPSY IN HODGKIN'S DISEASE. CLINICOPATHOLOGIC CORRELATIONS IN 127 PATIENTS. (E.) Bagley, C. M., Jr. (NCI, Bethesda, Md.), J. A. Roth, L. B. Thomas and V. T. DeVita, Jr. *Ann. Intern. Med.* 76(2):219-225, 1972.

Liver biopsies were performed in 127 patients with Hodgkin's disease; 89 of these had not had prior therapy and 14 of these 89 were again biopsied after therapy. Biopsies positive for Hodgkin's disease were seen in 8 of the 89 untreated and 12 of the 38 previously treated patients. In all 20 of the positive biopsies, atypical reticulum cells were seen in association with Reed-Sternberg cells in the involved portal triads. Using serial sections, in 13 of the 20, portal triads not containing Reed-Sternberg cells showed mononuclear, mixed cell or no infiltrates, while the other 7 showed 1 or more triads, elsewhere in the biopsy, that contained atypical reticulum cells at 1 or more levels of sectioning, without accompanying Reed-Sternberg cells in the same triad at any level examined. Among the 89 untreated patients there was no correlation between the absence of infiltrates or the presence of mononuclear or mixed cell infiltrates and any other histologic or clinical variables (symptoms, liver size, stage of nodal disease, any liver function test, Lukes-Butler class, eosinophil count or prognosis). When the untreated patients were classified by extent of nodal disease, more extensive disease showed significant correlations with the presence of fever, sweats, weight loss, a liver palpable more than 4 cm below the right costal margin, and the mixed-cellularity Lukes-Butler classification. The frequency of positive biopsies was doubled when a negative percutaneous biopsy was followed by peritoneoscopy or laparotomy.

10567 ECHOVIRUS 14 INFECTION ASSOCIATED WITH FATAL NEONATAL HEPATIC NECROSIS. (E.) Hughes, J. R., C. M. Wilfert, M. Moore, K. Benirschke and E. de Hoyos-Guevara (Dartmouth Med. Sch., Hanover, N. H.). *Am. J. Dis. Child.* 123(1):61-67, 1972.

At autopsy the most significant microscopic changes were found in the liver. About 95% of the parenchyma was necrotic and replaced by a sea of blood, but the reticulum was intact and there were occasional hematopoietic islands. Ultrastructurally the vacuoles in the liver appeared identical with cytophagolysosomes. Hepatocytes had 3 types of particles: cytoplasmic particles (10-15 mμ in diameter) closely packed in aggregates, spherical cytoplasmic particles (120-170 mμ) found singly and nuclear particles (16-28 mμ) loosely packed in groups. Echovirus 14 was isolated from the liver and was found to produce crystalline inclusions in the nucleus and cytoplasm in cell culture. Negative-stained virions were 30.3 mμ in diameter. Intra-uterine infection of the newborn was suggested by the elevated IgM and IgA liters at 6 days of age.

10568 INVESTIGATIONS OF LIVER BIOPSIES FOR AUSTRALIA ANTIGEN BY IMMUNOFLUORESCENT TECHNIQUE. (E.) Nielsen, J. O. (Blegdam Hosp., Copenhagen) and P. Elling. *Clin. Exp. Immunol.* 9(6):699-705, 1971.

From 124 patients with various liver diseases, 134 liver biopsies were examined by direct immunofluorescence for Australia antigen. FITC-labeled IgG fractions prepared from 3 different sera showed identical fluorescent patterns and reacted with the same biopsies. All 68 biopsies examined within 12 hr showed granular or speckled fluorescent particles localized in hepatocyte nuclei irrespective of clinical diagnosis. The cytoplasm often showed a discrete granular fluorescence. The nucleus particles resisted treatment with DNase and RNase. Fluorescent particles were also found in rat livers and spleens. Thirteen liver biopsies which showed positive fluorescent reaction if examined immediately after biopsies were obtained did not show any fluorescence when FITC-labeled antisera against human immunoglobulins were used. IgG prepared from sera containing antibodies to the Australia antigen may have 2 antigenic specificities, one precipitating with the Australia antigen in serum and another reacting by immunofluorescence with a labile antigen which appears to be a constituent of normal liver cell nuclei.

10569 IMMUNOLOGIC IMPLICATIONS IN HEPATIC PHYSIOPATHOLOGY. (Fr.) Nicolaescu, T. (D. Danielopolu Inst. Norm. Pathol. Physiol., Bucharest). *Rev. Roum. Physiol.* 8(4):313-322, 1971. (24 references)

A review of the use of prednisone and azathioprine in treating chronic hepatitis and cirrhosis includes references to 2 previous publications by the same writer.

10570 IDIOPATHIC EXTRAHEPATIC PORTAL HYPERTENSION IN ADULTS. (E.) Turcotte, J. G. (U. Michigan Med. Ctr., Ann Arbor) and C. G. Child, III. *Am. J. Surg.* 123(1):35-42, 1972.

Nine adults with bleeding gastro-esophageal varices secondary to portal vein thrombosis of unknown cause are presented. At least 5 had experienced vague abdominal pain not associated with hemorrhage at some time during their illness and all 9 showed splenomegaly at physical examination. Hypersplenism and a decreased prothrombin time were the most frequent laboratory abnormalities. Varices were not suspected in 4 of 9 patients at the time of initial gastro-intestinal hemorrhage. Liver function studies and liver biopsies were essentially normal. A conventional splenorenal or mesocaval shunt could be fashioned for only 2 patients; 5 patients with no shunt survived operation and remain alive for an average of 47.8 months. Only 2 have had rebleeding from varices. Complete angiographic evaluation of the portal venous system with portograms, splenoportograms, or tolazoline mesenteric arteriograms is essential for proper management of these patients.

10571 ALTERATIONS IN LIVER PLASMA MEMBRANES AND THEIR POSSIBLE ROLE IN CHOLESTASIS. (E.) Simon, F. R. (U. Colorado Med. Ctr., Denver) and I. M. Arias. *Gastroenterology* 62(2):342-345, 1972.

A review of the literature (30 references) including previously published work from the authors' laboratories. There are several characteristics which differentiate the plasma membrane of the hepatic parenchymal cell from other surface membranes: there is a functional polarity of the liver plasma membrane with respect to sinusoidal, canalicular and lateral surfaces; the major components of these membranes undergo differential synthesis and heterogeneous degradation. Membrane proteins seem to be synthesized elsewhere in the cell, probably in the endoplasmic reticulum, and are transferred to the plasma membrane for incorporation. Incorporation of these newly synthesized proteins probably occurs by either mixture in a soluble pool and subsequent incorporation and/or assembly into complex, lipoprotein, micelle-like units prior to incorporation. With respect to carrier molecules, the following have been characterized: specific pericytoplasmic binding proteins; specific membrane, lactose-binding protein (M-protein); a complex system of soluble proteins and membrane substrate-specific proteins involved in group translocation of sugars. Competition between several organic anions for binding by liver plasma membranes has been demonstrated in vitro.

10572 HEPATIC HYDATIDOSIS. PORTOGRAPHY FOLLOWING INJECTION OF THE UMBILICAL VEIN AS A MEANS OF TOPOGRAPHIC DELINEATION. (Sp.) Palma, F. (Gen. Hosp., Jaen, Spain). *Rev. Esp. Enferm. Apar. Dig.* 35(8):883-898, 1971.

In Jaén Province, fluoroscopic screening of one-fourth of the population indicated an overall incidence of pulmonary hydatidosis of 15.1 per 100,000 inhabitants, while a study of the clinical records of the Provincial Hospital indicated a ratio of the incidence of hepatic to pulmonary hydatidosis of 1.5 to 8.1. Among 30 patients who underwent surgery for hepatic hydatidosis, ages ranged from 6 to 58 yr. Presenting symptoms included 1 case each of subphrenic abscess and vomiting, 2 cases of hepatic colic and 26 cases of hepatomegaly and general malaise. Diagnosis was confirmed by X-ray, i.v. cholangiography, splenoportography, scintigram using ^{198}Au and/or portography following injection of the umbilical vein with lipiodol. Surgery included 15 cases of marsupialization, 12 of cystectomy plus pericystectomy, 2 of tunnelization (using the technique described by Guedj of Constantinople) and 1 of transduodenal sphincterotomy plus papillotomy. The tunnelization technique is reviewed in detail.

10573 STUDY OF THE PRODUCTION OF ALPHA-1-FETOPROTEIN IN THE COURSE OF THE DEVELOPMENT OF PRIMARY CARCINOMA OF THE LIVER. (BASED ON 83 CASES.). (Fr.) Sankalé, M. (Med.

Clin., Dakar, Senegal), R. Masseyeff, P. Teyssier and L. Leblanc. *Arch. Fr. Mal. App. Dig.* 60(12): 615-628, 1971.

Several methods are described for demonstrating the presence and/or relative concentration of serum α-1-fetoprotein in the peripheral circulation. The protein was found in 47 of 83 African Negro patients with malignant hepatoma who were studied in Dakar (64 men; 19 women); including 29 of 47 in whom the diagnosis was confirmed by autopsy or biopsy, 18 of 36 for whom confirmatory studies were not made. There was no significant sex difference in terms of the percentage frequency of incidence of the protein. No correlation could be demonstrated between the presence of the protein (or its relative concentration) and the duration of illness, the stage of the disease, histologic classification of tumors, or intercurrent disorders.

10574 THE CONTRIBUTION OF BIOCHEMISTRY TO THE DIAGNOSIS OF HEPATIC METASTASES. (Fr.)

Plomteux, G. (Lab. Med. Chem., Liege, Belgium) and J. Toulet. *Arch. Fr. Mal. App. Dig.* 60(12): 597-614, 1971.

Biochemical studies were made of sera derived from 262 blood donors in apparent good health, 161 patients with primary cancers of various sites but no evidence of metastasis to the liver, and 60 similar patients with confirmed metastasis to the liver. As compared to both control groups, a simultaneous, significant increase of the levels of total serum lactic dehydrogenase and its isoenzymes III, IV and V was seen in 40% of the patients with hepatic metastases. The ability to discriminate these patients was increased to 63% by the addition of studies of alkaline phosphatase, 5-nucleotidase, leucine aminopeptidase, γ-glutamyl transpeptidase, ornithinecarbamyl transferase, SGOT and SGPT, total bilirubin, serum albumin and serum α_1-, α_2-, β- and γ-globulins.

10575 RELATIONSHIP OF HEPATIC IRON CONCENTRATION TO HISTOCHEMICAL GRADING AND TO TOTAL CHELATABLE BODY IRON IN CONDITIONS ASSOCIATED WITH IRON OVERLOAD. (E.)

Walker, R. J. (King's Coll. Hosp., London), J. P. G. Miller, I. W. Dymock, K. B. Shilkin and R. Williams. *Gut* 12(12): 1011-1014, 1971.

Total tissue iron concentration was measured in needle liver biopsy specimens taken from 47 patients with various levels of body iron stores using a technique based on the measurement of iron by atomic absorption spectrophotometry. A close and statistically highly significant linear relationship was observed between the hepatic iron concentration and the total chelatable body iron stores measured by the differential ferrioxamine test. In contrast, no correlation could be demonstrated between the values for iron concentration and the histochemical grading of hepatic iron. Significant increases in iron concentrations were only observed in patients with histochemical grades 3 and 4, all except one of whom had primary hemochromatosis. Of the 47 patients examined, 26 had primary idiopathic hemochromatosis, 7 patients had cryptogenic cirrhosis, 4 had alcoholic cirrhosis, 2 had no evidence of liver disease, and 8 had various disorders related to the liver. Thus, a liver biopsy can be valuble in the quantitative determination of total body iron overload as well as in the diagnosis of underlying liver disease.

10576 ^{47}CALCIUM ABSORPTION IN PARENCHYMATOUS AND BILIARY LIVER DISEASE. (E.)

Whelton, M. J. (St. Finbarrs Hosp., Cork, Ireland), A. K. Kehayoglou, J. E. Agnew, L. A. Turnberg and S. Sherlock. *Gut* 12(12):978-983, 1971.

Calcium absorption was assessed in 25 patients with chronic non-biliary disease and compared with 17 patients with biliary disease and 16 normal subjects. The mean whole body ^{47}Ca retention was depressed in the 10 patients with non-biliary disease who were jaundiced but normal in the 15 anicteric patients. The presence of portacaval shunts or the administration of corticosteroids did not alter mean retention in these cases. Retention in the 5 patients with primary biliary cirrhosis was lower than in the control group. Retention improved in 4 of the 5 patients studied again after Vitamin D therapy, these patients showing an increase in 3-hr plasma radioactivity as well. Three-hr plasma levels of radioactivity showed a similar distribution to the results for whole body retention : the highest mean value were seen in normals and anicteric patients with non-biliary liver disease, while icteric patients and those with primary biliary cirrhosis and extra- and intrahepatic cholestasis had low values. A significant negative correlation was observed between fecal fat and whole body retention.

10577 DIAGNOSIS OF HEPATOMA USING A MULTIPLE RADIONUCLIDE APPROACH. (E.)

Anderson, J. E. (US Public Health Serv. Hosp., Staten Island, N. Y.) and G. S. Perlmutter. *Radiology* 102(2):387-389, 1972.

A single case is presented of a 50-yr-old Oriental male with a 2-week history of right upper quadrant pain. Physical examination revealed a firm, slightly tender right upper quadrant mass inseparable from the liver. A liver scan with ^{99m}Tc-sulfur colloid demonstrated a total lack of uptake in the lateral two-thirds of the right lobe of the liver. A blood pool scan of the liver using ^{131}I-human serum albumin revealed patchy areas of uptake most prominent along the medial aspect of the right lobe in a zone demonstrating no uptake on the ^{99m}Tc-sulfur colloid scan. After this the patient was given ^{75}Se selenomethionine and the abdomen was scanned at

10 min, and at 2 and 24 hr. These scans revealed no pancreatic abnormality, but definite uptake of the ^{75}Se was seen in the right lobe corresponding to areas of absence of uptake of ^{99m}-Tc. Celiac arteriography revealed a large space-occupying lesion in the right lobe of the liver displacing and stretching the right hepatic artery and its branches, and definite tumor vascularity was defined on the medial aspect of the mass, while the main body and lateral aspect of the mass demonstrated a relative lack of vascularity. A needle biopsy revealed typical hepatoma cells. At surgery a large necrotic hepatoma involving the entire right lobe of the liver was found and a total right lobectomy was performed. A scan 1 month after surgery revealed partial regeneration of the right lobe of the liver with no evidence of recurrent space-occupying lesion.

10578 THE VALUE OF TOMOGRAPHY IN LIVER SCANNING.

(E.) DeLand, F. H. (U. Florida Div. Nucl. Med., Gainesville), A. E. James, G. Muehllehner and H. N. Wagner, Jr. *Radiology* 102(2):429-432, 1972.

The authors describe a method of tomographic scanning employing a stationary Anger scintillation camera equipped with a slanted-hole collimator and a table with a movable top. The collimator rotates at a frequency of about one revolution/min, while the table simultaneously moves in a circular pattern at the same frequency and in phase with the collimator. Four planes are simultaneously recorded in focus on Polaroid film by displaying 4 images on a cathode-ray tube. In this study, the results with tomography were compared with those of rectilinear scanning and stationary imaging. Of 26 patients with normal liver on routine examination, tomography was helpful in verifying variations in configuration in 5, and of no help in 21. In 3 with hepatomegaly and uniform distribution of the radionuclide (^{99m}-Tc-sulfur colloid) tomography was not helpful except to confirm the absence of deep-seated focal defects; nor was it helpful in 14 patients with hepatomegaly and heterogeneous distribution of activity. The tomography was helpful in better characterizing the lesions in 5 of 7 with proved defects.

10579 LIVER BIOPSY DURING EXPLORATORY LAPAROTOMY IN PATIENTS WITH HODGKIN'S DISEASE. DIAGNOSTIC VALUE AND SIGNIFICANCE OF THE LESIONS OBSERVED.

(Fr.) Diebold, J. (Hotel Dieu, Paris) and J. P. Camilleri. *Pathol. Eur.* 6(3):299-312, 1971.

Biopsy of both lobes of the liver was performed in 63 patients undergoing splenectomy and exploratory laparotomy for Hodgkin's disease. In 4 of 63, foci of the disease were demonstrable in the biopsy specimens, accompanied in all 4 by splenic lesions and lymphadenopathy in the deep abdominal chains. The affected patients had been ill for only 6, 7, 18 and 30 months, resp. In 5 other patients, portal infiltration of large reticular cells (some of them dystrophic) was accompanied by the presence of small, intralobular accumulations of lymphoreticulocytes, similar to those which are observed at some distance from actual granulomatous lesions in the livers of patients with advanced Hodgkin's disease. Foci of the disorder were demonstrable in 31 of the 63 ablated spleens accompanied by invasion of the abdominal ganglia, the hilus of the spleen, or both, in 25 of 31.

10580 SPLENORENAL ANASTOMOSES FOR PORTAL HYPERTENSION. FIFTY-SEVEN ORIGINAL CASES.

(Fr.) Saubier, E. C. (E. Herriot Hosp., Lyon, France) and J. A. Brault. *Lyon Chir.* 67(4):247-256, 1971.

Splenorenal shunts were created for portal hypertensions due to cavernoma or portal thrombosis (10 cases), posthepatic cirrhosis (4 cases) and cirrhosis resulting from alcoholism (20 cases), undetermined causes (19 cases), cholostasis (2 cases) or Wilson's or Rendu-Osler's disease (1 case each). The age range of the patients was from less than 9 to 79 years (mean, 28 yr); the male-female ratio, 2:1. The immediate postoperative mortality rate (all causes) was 10%; the total, 19%. Postoperative complications in survivors were limited to recurrence of gastrointestinal hemorrhaging, due to thrombosis or ulcer (8 cases; 3 of 8, fatal) and severe portacaval encephalopathy (2 cases; 1 of 2, fatal). Transient, reversible symptoms of encephalopathy (slight disturbance of memory or postprandial somnolence) were seen in 7 other patients. Among 25 who had been followed for 8 months-10 yr, at the time of report, 1 was disabled by chronic encephalopathy (see above); 1 had died of viral hepatitis, 6 yr after surgery; 23 had remained symptom-free and capable of leading normal lives, although 2 of 23 had reverted to habitual intemperance (1 of 2 requiring intercurrent surgery for a bleeding gastric ulcer).

10581 A CYST OF THE HEPATOCHOLEDOCHUS WITH CONGENITAL, SEGMENTAL DILATATION OF THE INTRAHEPATIC BILIARY PATHWAYS (CAROLI'S DISEASE) AND PORTAL HYPERTENSION.

(Fr.) Saubier, E., H. Viard, C. Partensky and A. Brault. *Lyon Chir.* 67(4):299-301, 1971.

A 20-yr-old woman with chronic cholangitis, a massive hepatocholedochal cyst, congenital dilatation of the intrahepatic biliary pathways, portal hypertension and multiple esophageal varices underwent repeated surgical interventions over a period of 12 yr. These included choledochoduodenostomy, splenectomy, splenorenal anastomosis (repeated later, following thrombosis), surgery for occlusion of the small intestine, hepaticojejunostomy (repeated later, following stenosis) and a mesenteriocaval anastomosis, which was followed by gradual disappearance of the esophageal varices. At the time of report the patient had remained symptom-free for 2 yr, following the last intervention.

10582 HEPATIC SUPPORT THERAPY BY INTERMITTENT LIVER PERFUSIONS AND EXCHANGE BLOOD TRANSFUSIONS. (E.) Abouna, G. M. (U. Colorado Med. Ctr., Boulder), H. Amemiya, L. M. Fisher, W. J. Still, K. A. Porter, G. Costa and D. M. Hume. *Transplant. Proc.* 3(4):1589-1596, 1971.

Fifteen patients with deep hepatic coma who were treated either by repeated exchange blood transfusions alone, by intermittent ex vivo heterologous and homologous liver perfusions alone, or by a combination of both techniques are reported. All 5 patients treated by exchange transfusions alone failed to recover consciousness and died 2-6 days after admission. Of the 5 patients treated by pig liver perfusion alone, 1 recovered normal consciousness and 3 showed objective clinical improvement. In the 5 patients treated by a combination of techniques, no objective clinical improvement was seen after several repeated exchange transfusions, but perfusions with pig, baboon, and human livers were successful in reversing Grade IV hepatic coma on each of 13 separate occasions in 4 patients. Exchange transfusions and liver perfusions were both effective in clearing bilirubin and in producing marked improvement in blood coagulation. Heterologous perfusions with pig and baboon livers were accompanied by a fall in the level of preformed hetero-antibodies; however, these antibodies increased 8- to 10-fold during the next 12-15 days after perfusion but returned to preperfusion levels 5-6 weeks later. The results indicate that successful management of acute hepatic coma, with ultimate patient survival, is possible by ex vivo baboon liver perfusions supplemented by intermittent and limited exchange blood transfusions.

10583 ULTRASTRUCTURE OF HYALINE CYTOPLASMIC INCLUSIONS IN A HUMAN HEPATOMA: RELATIONSHIP TO MALLORY'S ALCOHOLIC HYALIN. (E.) Keeley, A. F. (Boston City Hosp., Mass.), O. A. Iseri and L. S. Gottlieb. *Gastroenterology* 62(2): 280-293, 1972.

Light and electron microscopy were performed on sections of a biopsy specimen of hepatoma tissue from a patient with mildly active alcoholic cirrhosis. Both forms of hepatoma hyaline inclusions were found. The reticular form was identical to the alcoholic hyalin of Mallory. Other than a closer packing of fibrils, the globular deposits of hyalin had a fibrillar internal structure virtually indistinguishable from the above. The most striking difference between hepatoma cells with and without hyalin was the presence of greatly increased amounts of smooth endoplasmic reticulum in the cytoplasm of cells without hyalin. Also prominent in tumor cells without hyalin were circular concentric lamellar arrays of membranes of the type seen in the livers of rats treated with drugs (such as dieldrin and methyl butter yellow). Examination of metastatic hepatoma from the patient's neck showed no hyalin material, but cytoplasmic concentric lamellar arrays of membranes were seen in abundance.

10584 TWO CASES OF PERIARTERITIS NODOSA WITH LIVER INVOLVEMENT AND AUSTRALIA ANTIGEN. (Fr.) Trépo, C. (Red Cross Hosp., Lyon, France) and M. Girard. *J. Med. Lyon* 52(1214):1235-1237, 1971.

The Australia antigen was demonstrated in the serum of 2 patients with periarteritis nodosa. One presented initially with a cholostatic viral hepatitis, complicated by long-standing alcoholism, and proved resistant to treatment with prednisone (20 mg/day for a yr), prior to sudden death due to hypertension and a consequent cerebral accident. The other presented initially with inflammatory, cholostatic cirrhosis of the liver, complicated by atrophic cystitis; died after 2 emergency operations for occlusive syndrome in the course of 1 yr, during which he also developed amyotrophia, neuritis and progressive cachexia.

10585 HEPATIC CALCIFICATIONS ASSOCIATED WITH UMBILICAL VEIN CATHETERIZATION IN THE NEWBORN INFANT. (E.) Ablow, R. C. (Mt. Zion Hosp., San Francisco, Calif.) and E. L. Effman. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 114(2): 380-385, 1972.

Two premature infants with the respiratory distress syndrome who developed calcifications in the liver adjacent to where an umbilical vein catheter had been positioned and used for infusion are reported. In both cases the tip of the catheter was not in the desired position, the inferior vena cava, when fluids were infused. The wedging of the catheter into smaller hepatic venous branches may have induced spasm, slowed blood flow, and enhanced thrombosis as well as bathed the region more thoroughly in the fluids infused. The observed calcifications were most likely dystrophic and are strong evidence of liver damage not severe enough to be clinically manifest. In both cases the calcifications became visible soon after catheter removal. In 1 case the linear distribution and course of the calcifications suggested location in veins through which the catheter passed. In the other case, the calcifications formed a large nodular density just distal to the catheter tip, raising the possibility of parenchymal necrosis. In both cases the calcifications disappeared spontaneously.

10586 BILE SALT DEPLETION IN THE RUNTING SYNDROME. (E.) Palmer, R. H. (U. Chicago Pritzker Sch. Med., Ill.) and R. W. Reilly. *Transplantation* 12(6):479-483, 1971.

Runting was produced in newborn (C57BL/6 X DBA/A)F_1 hybrid mice by the i.v. injection of 4 X 10^6

live spleen cells from 12-24-week-old male C57BL/6 mice. In segments of proximal small intestine, the bile salt content in 7- and 10-day old runts was less than in their control littermates; the 40% reduction was significant. There was no significant difference between the 2 groups when the bile salt content was expressed per g of body weight. A calculated 'bile salt index' was not related to liver index, but did correlate with the spleen index. In mice studied earlier, there was a significant reduction in bile salts on days 6 and 7 that was not seen on day 5. The intestinal weight of runts was significantly greater than those of controls on days 6 and 7, but not on day 5. In 9-day-old mice who received a single i.p. injection of sodium deoxycholate-24-^{14}C and killed 1 day later, analysis of labeled metabolites yielded variable results and did not reveal any important or consistent increase in the unconjugated fraction.

10587 BACTERIAL AND DIETARY ANTIBODIES IN LIVER DISEASE. (E.) Triger, D. R. (Radcliffe Infirm., Oxford, England), M. H. Alp and R. Wright. *Lancet* 1(7741):60-63, 1972.

Subjects consisted of normal controls (147) and patients with acute hepatitis (51), cirrhosis (85), chronic active hepatitis (40) and ulcerative colitis (147). Serum was collected for estimation of antibody titers to bacterial, rat fecal colonic and dietary antigens. Using an E. coli titer greater than 1:32, significant elevations over controls were seen in all 3 patient groups with liver disease, and this was greatest with chronic active hepatitis. The same was seen with Bacteroides (titer greater than 1/16). There were no significant elevations of titers of H. influenzae (greater than 1:4) in any of the patient groups. There was a highly significant increase in the frequency of hemagglutinating antibodies to rat colon (greater than 1:32) only in those with chronic active hepatitis. There were no elevations among the patient groups with respect to titers to ovalbumin (greater than 1:32) or β-lactoglobulin (greater than 1:64). There were significant elevations of titers to α-lactalbumin (greater than 1:16) in patients with cirrhosis and to gluten fraction III (greater than 1:32) in patients with acute hepatitis and, to a lesser extent, cirrhosis. In 8 patients with acute viral hepatitis, antibody titers of H. influenzae did not change during the course of the hepatitis (12 months of observation), while values for E. coli were normal at the onset, peaked by month 2, and gradually returned to normal by month 12.

10588 CURRENT METHODS FOR SUPPORT OF PATIENTS IN HEPATIC FAILURE. (E.) Hume, D. M. (Med. Coll. Virginia, Richmond), W. E. Gayle, D. H. Smith, G. M. Abouna and H. M. Lee. *Transplant. Proc.* 3(4):1525-1535, 1971.

Exchange transfusion and plasmaphoresis are useful adjuncts in the treatment of hepatic failure, particularly for their value in restoring clotting properties to the blood and controlling bleeding. If properly carried out (standby arterial pump, short blood lines with heparin-protamine injectors, heat exchanges) extracorporeal heterologous liver perfusion with the baboon liver is a good treatment for hepatic coma. Coma and the hepatorenal syndrome may also be relieved by heterologous cross circulation, which is limited in usefulness because of poor correspondence between the baboon ABO blood types and those of the human. Within 72 hr of L-dopa administration, 1 patient with hepatitis and halothane damage in a coma for 3 weeks, and resistant to other forms of therapy improved markedly.

10589 METABOLIC CONSIDERATIONS IN TREATMENT OF LIVER FAILURE WITH PARTICULAR REFERENCE TO USE OF EX VIVO PERFUSED PIG LIVER. (E.) McDermott, W. V., Jr. (Harvard Med. Sch., Boston, Mass.) and J. C. Norman, Jr. *Transplant. Proc.* 3(4):1509-1517, 1971.

Exchange transfusions either with whole blood or with fresh frozen plasma plus the patients own RBC appears to best combine simplicity and effectiveness. Extracorporeal auxiliary pig liver, more effective in terms of synthesis than exchange, was utilized in successive perfusions of up to 7 hr in duration in a group of 10 patients who were catastrophically ill with stage 4 hepatic coma and anuria. No survivals occurred in this group. Although these pig liver perfusions were tolerated without anaphylaxis and without demonstrable antibody formation, the complexity of successive pig liver perfusions and the lack of long term success argues against its widespread use in support of patients with fulminant hepatic failure.

10590 POSTOPERATIVE OCCLUSION OF A PORTACAVAL ANASTOMOSIS WITH TISSUE GLUE. (Ger.) Prenner, K. (Country Hosp., Salzburg, Austria). *Int. Z. Klin. Pharmakol. Ther. Toxicol.* 5(2): 225-226, 1971.

A fatal shunt operation in a 58-yr-old woman is described in detail. The application of histoacryl N-blue on a surgical band led to the early occlusion of the portacaval anastomosis. It is suggested that tissue glue of this type not be used in surgery involving large veins.

10591 PROSTHETICS IN HEPATIC ASSISTANCE. (E.) Eiseman, B. (U. Colorado Med. Ctr., Denver) and T. Soyer. *Transplant. Proc.* 3(4):1519-1524, 1971.

Extracorporeal liver support was investigated using cellular and subcellular liver fractions in direct contact with blood or plasma. Techniques and experience prompting the investigation are new prosthetic membranes both for dialysis and as cell filters; devices for continuous separation of cells from fluid blood elements; and experience with extracorporeal hepatic assist using whole livers. Indications for the future use of extracorporeal hepatic support lie in providing maintenance for a patient awaiting availability of a suitable donor organ. More frequent use will come for patients in failure following acute viral or chemical toxic hepatic damage. Current emphasis is on the utilization of liver slices and liver cell suspensions to provide such support.

10592 PORTAL HYPERTENSION IN RATS BY GRADUAL OCCLUSION OF THE PORTAL VEIN. (Ger.) Liehr, H. (Justus Liebig U. Med. Clin., Giessen, Germany), M. Grun and M. H. Horder. *Z. Gesamte Exp. Med.* 155(3):267-272, 1971.

10593 THE SERUM LEVEL OF IMMUNOGLOBULIN, ALBUMIN, AND BIC/IA GLOBULIN IN PATIENTS WITH LIVER DISEASE. (Ger.) Aigner, A. (Univ. Med. Clin., Innsbruck, Austria), F. Gabl and E. Knapp. *Wien. Klin. Wochenschr.* 83(36):637-640, 1971.

10594 CLINICAL VALUE OF RADIOISOTOPE SPLENOPORTOGRAPHY IN PORTAL HYPERTENSION. (Rus.) Ershov, J. A., A. V. Upirev and M. S. Barsagov. *Vestn. Khir.* 107(9):38-42, 1971.

10595 HEPATECTOMY AFTER PRIMARY NONRADICAL OPERATIONS FOR ECHINOCOCCOSIS. (Rus.) Krakovskii, A. I. and R. A. Nikhinson. *Vestn. Khir.* 107(7):30-34, 1971.

10596 THE HISTOTOPOCHEMICAL BEHAVIOR OF LYSOSOMAL B GLUCURONIDASE IN LIVER BIOPSY CYLINDERS STUDIED IN DIFFERENT LIVER DISEASES. (Ger.) Rath, F. W. (Martin Luther U. Inst. Pathol., Halle, Germany), R. Nilius and L. Otto. *Z. Gesamte Inn. Med.* 26(19):262-263, 1971.

10597 LIVER FUNCTION AND MORPHOLIGY IN RHEUMATOID ARTHRITIS. (Ger.) Rau, R. (U. Zurich Rheumatol. Clin., Switzerland), R. Rondez and P. Grob. *Z. Rheumaforsch.* 30(7-8):205-213, 1971.

10598 LIVER FUNCTION IN GOUT AND ASYMPTOMATIC HYPERURICEMIA (STUDY OF 79 CASES). (Ger.) Klein, W. W. (Univ. Intern. Med. Clin., Graz, Austria). *Z. Rheumaforsch.* 30(7-8):230-235, 1971.

10599 THE BALNEOPHYSICAL TREATMENT IN DISORDERS OF THE LIVER. (Ger.) Boecker, W. (Frauenberg Sanit., Bad Mergentheim, Germany) and K. Imle. *Z. Phys. Med.* 2(5):389-398, 1971.

10600 TOTAL ANOMALOUS PULMONARY VENOUS DRAINAGE INTO THE PORTAL VEIN. (Ger.) Hertel, E. U. (Univ. Hamburg Pathol. Inst., Germany) and M. F. Baghirzade. *Zentralbl. Allg. Pathol.* 114(4):480-492, 1971.

10601 SKIN AND LIVER. (Ger.) Ippen, H. (Univ. Dermatol. Clin., Dusseldorf, Germany). *Z. Haut. Geschlechtskr.* 46(19):567-569, 1971.

10602 HEMANGIOMA OF THE LIVER. (Rus.) Voskanov, M. A. (4 City Clin. Hosp., Moscow) and T. I. Tukhomirova. *Ter. Arkh.* 43(8):122-123, 1971.

10603 EXPERIENCES WITH ANATOMIC HEMIHEPATECTOMY AND LEFT LOBECTOMY. (E.) Mercadier, M. and J. P. Clot. *Surg. Gynecol. Obstet.* 133(2):467-471, 1971.

10604 TRUNCULAR PORTACAVAL ANASTOMOSES. PROBLEMS OF SURGICAL TACTICS AND TECHNIQUES. (Rum.) Bancu, E. (Ist Surg. Clin., Tirgu Mures, Rumania), Z. Papai and N. Csiky. *Spitalul* 84(3):219-224, 1971.

10605 FUNCTIONAL AND STRUCTURAL INTERRELATIONS IN THE LIVER DURING ALLERGIC HEPATITIS. (Rus.) Saakov, B. A. (Med. Inst., Rostov, USSR), V. I. Shepotinovskii and Z. I. Mikashinovich. *Patol. Fiziol. Eksp. Ter.* 15(5):51-54, 1971.

10606 TREATMENT OF EXPERIMENTAL HEPATIC FAILURE BY EXTRACORPOREAL LIVER PERFUSION. (Sp.) Ortiz Hurtado, H. (U. Navarra Sch. Med., Spain), G. Zornoza and J. Perez Cabanas. *Rev. Med. Univ. Navarra* 15(1):33-43, 1971.

10607 ARTERIOGRAPHIC DEMONSTRATION OF HYDATID CYST OF THE LIVER. 1. THE LARGE INTRAPARENCHYMATOUS CYSTS OF THE RIGHT LOBE OF THE LIVER. (Sp.) Muro, J. (La Paz Social Security Clin., Madrid), P. San Martin and J. Ortiz Vazquez. *Rev. Clin. Esp.* 122(3):199-210, 1971.

10608 AUSCULTATION OF ABDOMINAL MURMURS: THE PHONOHEPATOGRAM. (Sp.) Bacardi, R. (Social Security City Sanit., Barcelona, Spain), J. Guardia and H. Garcia Del Castillo. *Med. Clin. (Barc.)* 56(5):697-699, 1971.

10609 THE QUESTION OF ACUTE AND CHRONIC LIVER DAMAGE DURING AND FOLLOWING TROPICAL DISEASES. (Ger.) Mohr, W. (Bernhard

Nocht Inst., Hamburg, Germany). *Mat. Med. Nordmark* 23(9-10):267-286, 1971.

10610 MAGNESIUM DEFICIENCY DUE TO HEPATIC DISEASE. (Ger.) Holtmeier, H. J. (U. Stuttgart Dept. Physiol., Germany). *Mat. Med. Nordmark* 23(9-10):264-266, 1971.

10611 HEPATIC LESIONS FOLLOWING END-TO-SIDE PORTACAVAL SHUNT. AN EXPERIMENTAL, HISTOLOGICAL AND ULTRASTRUCTURAL STUDY. (Fr.) Mallet Guy, P. (Edouard Herriot Hosp., Lyon, France), J. Feroldi and Y. Mallet Guy. *Lyon Chir.* 67(3):181-192, 1971.

10612 A CASE OF BENIGN FAMILIAL HYPERBILIRUBINEMIA. THE SO-CALLED ROTOR SYNDROME. (Pol.) Czarnecki, J. (Med. Acad. 2nd Intern. Dis. Clin., Lublin, Poland), A. Nowakowski and J. Pokora. *Pol. Tyg. Lek.* 26(25):956-958, 1971.

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10670 ECK'S FISTULA ENCEPHALOPATHY IN GERMFREE DOGS. (E.) Nance, F. C. (Louisiana State U. Sch. Med., New Orleans) and D. G. Kline. *Ann. Surg.* 174(5):856-862, 1971.

See also numbers: 9893, 9894, 10041, 10044, 10062, 10140, 10144, 10149, 10161, 10169, 10822, 10861, 10863

ACUTE NONVIRAL HEPATITIS AND HEPATIC INJURY

10671 PATTERNS OF LIVER INJURY AFTER FATAL BLUNT TRAUMA. (E.) Hardy, K. J. (U. Melbourne Repatriation Gen. Hosp., Heidelberg, Australia). *Surg. Gynecol. Obstet.* 134(1): 139-143, 1972.

The pattern of liver damage was examined in 50 victims of fatal blunt trauma occurring mostly in automobile accidents. The type of injury observed was a shattering and/or a splitting with extensive hematoma formation. The most frequent pattern of injury was a shattering of the right posterior-superior aspect of the liver (45). This is the bursting type of injury, as when the dome of a paper bag full of air, bursts after it is hit suddenly, or when a steering wheel strikes the body. Surgical access to this area being difficult, mobilization by division of the superior and inferior leaves of the coronary ligament is necessary to inspect and treat damage in this area. Treatment consists of right hemihepatectomy. There was a rarity of major vessel damage or extension of injury into the porta hepatis.

10672 GRANULOMATOUS HEPATITIS IN A PATIENT RECEIVING ALLOPURINOL. (E.) Simmons, F. (Roy. Free Hosp., London), B. Feldman and D. Gerety. *Gastroenterology* 62(1):101-104, 1972.

An alcoholic patient with normal liver function received 100 mg allopurinol 5 times a day for 1 month. Despite gradual onset of a low grade fever, weight loss, and complaints of anorexia and night sweats, progressive improvement in renal function was noted. However, 3 weeks after allopurinol, eosinophils and a deterioration in liver function were observed. Uric acid level was 4.1 mg/100 ml. Liver biopsy at 1 month revealed multiple, non-caseating epithelioid granulomas chiefly in or adjacent to portal triads, focal necrosis, and a mild, fatty metamorphosis. Shortly after allopurinol was discontinued the patient became afebrile, had an increase in appetite and liver biopsy revealed complete absence of granulomas. Evidence consistent with drug-induced hepatitis and histologic evidence of granulomatous hepatitis suggest that allopurinol caused a granulomatous hepatitis.

10673 9-α-FLUOROHYDROCORTISONE INDUCED ASCITES IN ALCOHOLIC LIVER DISEASE. (E.) Denison, E. K. (550 Washington St., San Diego, Calif.), F. L. Lieberman and T. B. Reynolds. *Gastroenterology* 61(4, Pt. 1):497-503, 1971.

The effect of 9-α-fluorohydrocortisone on ascites induction was studied in 14 patients with alcoholic liver disease and portal hypertension. All patients were able to excrete sodium normally at the time that 9-α-fluorohydrocortisone was begun. The response to mineralocorticoid administration differed from normal in that weight gain was excessive in most cases, escape from sodium retention failed to occur in 6 trials, and ascites developed in 9 of 16 trials. All patients were able to excrete large amounts of sodium and to return to normal sodium balance after the mineralocorticoid was discontinued. Although those who previously had had ascites were likely again to develop ascites with mineralocorticoid-induced sodium retention, those who never had ascites were less likely to develop ascites during the study and were better able to escape from the sodium retention of 9-α-fluorohydrocortisone. The only significant difference between the patients with and without a history of ascites was the wedged hepatic vein pressure which was higher in the former group.

10674 HEPATITIS INDUCED BY METHYLDOPA (ALDOMET). REPORT OF A CASE AND A REVIEW OF THE LITERATURE. (E.) Tysell, J. E., Jr. and C. M. Knauer (Santa Clara Valley Med. Ctr., San Jose, Calif.). *Am. J. Dig. Dis.* 16(9):849-855, 1971.

Needle biopsy of the liver of a 38-yr-old woman, seen in consultation on June 4, 1969, showed acute hepatic cellular necrosis. Hepatic function tests were markedly abnormal. The patient had a previous diagnosis of active hepatitis in 1964. At that time her hepatic symptoms developed after 2 months of methyldopa therapy (250 mg/day) for persistent hypertension. Medication was discontinued and the patient made an uneventual recovery in 3 months. In 1966 the patient underwent a cholecystectomy and an open biopsy of the liver which revealed a normal hepatic architecture with a mild increase in mononuclear cells in the portal area. No blood transfusion was necessary. Methyldopa was inadvertently given again for persistent hypertension on May 9, 1969 (250 mg b.i.d.). Symptoms developed rapidly and the above diagnosis made. An uncomplicated recovery was made when the drug was stopped. Pathogenesis seems based on hypersensitivity rather than toxicity. A histopathological picture indistinguishable from viral hepatitis is presented by the hypersensitivity. A search of the literature reveals 2 types of reaction: a more common more slowly developing hepatitis and a rapidly developing type.

10675 ACUTE ALCOHOLIC HEPATITIS. (Sp.) Teres, M. (Prov. Clin. Hosp., Barcelona, Spain), M. Bruguera, J. Rodes, J. M. Bordas and J. Gilbert-Queralto. *Rev. Esp. Enferm. Apar. Dig.* 35(7):785-802, 1971.

Bed rest, total abstinence from alcohol and conventional vitamin therapy were used to treat 20 patients with histologically confirmed, acute alcoholic hepatitis (11 men, 9 women). The onset was abrupt in all cases and was characterized by jaundice in 15 of 20, acute abdominal pain in 13 of 20, fever in 12 of 20 and nausea and vomiting in 8 of 20. Hepatomegaly was seen in 19 of 20, accompanied by splenomegaly in 5 of 19. Only 9 of 20 showed biopsy evidence of cirrhosis. Among 14 who could be followed, 11 of 14 experienced disappearance of the presenting symptoms within 3-4 weeks, except for ascites (present in 4 of these 11), which required up to 45 days to regress completely. In 1 of 14 complete recovery was delayed for 4 months, presumably due to iatrogenic complications following exploratory laparotomy; 2 of 14 died after 12 and 23 days, resp, in the presence of acute hepatic insufficiency and encephalopathy (accompanied, in 1 of 2, by renal insufficiency and gastrointestinal hemorrhage).

10676 REACTION OF THE MONGOLIAN GERBIL TO A CHOLESTEROL-CHOLIC ACID-CONTAINING GALLSTONE INDUCING DIET. (E.) Bergman, F. (U. Umea Dept. Pathol., Sweden) and W. van der Linden. *Acta Pathol. Microbiol. Scand.* [*A*] 79(5):476-486, 1971.

Biochemical and morphologic changes in the development and regression of gallstones were studied in 100 Mongolian gerbils following prolonged administration of a cholesterol-cholic acid supplemented diet. After 4 months, the test group showed enlarged yellow steatotic livers and extremely dilated gallbladders. Large accumulations of small whitish gallstones consisting of cholesterol were found in the test group and none were found in the controls. In addition, the test group had enlarged spleens and ascites. Fatty degeneration with massive intracellular lipid and cholesterol contents were found in parenchymal and Kupffer cells and included polymorphism and slight fibrosis. Gallbladders were slightly fibrotic with atrophic ulcerated mucous membranes. Lipid and cholesterol accumulations were also found in the reticuloendothelial cells of the lungs, spleen, lymph nodes, kidney and adrenal cortex. Serum cholesterol levels were 867 mg% in the test group and 104 mg% in normal controls. Discontinuance of the special cholesterol-cholic acid diet showed a gradual return to normal cholesterol levels with an equally slow and somewhat incomplete histological normalization. The gerbil and the mouse show some differences in the way they rid themselves of excess cholesterol, but react much the same to a cholesterol-cholic acid diet. Since the gerbil showed poor tolerance to the diet over long periods of time, it seems to be a less suitable model for study.

10677 ALTERATIONS OF TRANSFERRIN IN THE COURSE OF CHRONIC HEPATIC DAMAGE. (Sp.) Perez Miranda, M. (U. Navarra Sch. Med., Spain). *Rev. Med. Univ. Navarra* 15(1):1-18, 1971.

10678 PROBLEM OF THE HEPATIC VEINS DURING EMERGENCY HEPATECTOMY FOR LIVER TRAUMA. (Fr.) Delvert, B. (CHU Serv. Clin. Surg. A, Tours, France), J. Delplace, B. Barjou and M. Vandooren. *J. Chir. (Paris)* 102(1-2):85-94, 1971.

10679 MORPHOLOGIC CHANGES IN LIVER AND KIDNEY AFTER IN VIVO FREEZING WITH CRYOPROBE. (E.) Blackburn, E. D. (Ohio State U. Coll. Med., Columbus), J. E. King, W. G. Pace and N. R. Thomford. *Cryobiology* 8(4):333-338, 1971.

See also numbers: 10042, 10043, 10070

10680 THE EFFECT OF DEFINED PHYSICAL EXERCISE IN THE EARLY CONVALESCENCE OF VIRAL HEPATITIS. (E.) Edlund, A. (U. Uppsala Dept. Infect. Dis., Sweden). *Scand. J. Infect. Dis.* 3(3):189-196, 1971.

The effect of defined physical exercise on an ordinary series of hospital patients of both sexes (10 women, 13 men) with serum hepatitis (long incubation period) was studied. The patients were treated with bedrest until the SGPT value was below 300 IU, which constituted the only criterion for the start of exercise which consisted of bicycling on an ergotometer bicycle for 6 days. No enlargement or increased tenderness of the liver were noted during the period of exercise. In 19 of the 23 patients the serum transaminase and bilirubin levels continued to decrease during the period of exercise, while only 4 exhibited an increase of the transaminases and bilirubin. At the follow-up examinations 1, 2, 4, 8 and 12 weeks after discharge, the laboratory values showed a progressive return to normal in essentially the same way as has been observed in a conventially-treated group of hepatitis patients of the same ages. The SGOT and SGPT values exhibited parallel courses at this stage of the disease, but SGPT was always the last to return to normal. Twelve weeks after discharge from the hospital, there was still 1 patient with pathologic transaminase values. Two patients did not return after the 4 and 8 week examinations at which times their transaminase values were still elevated. All 3 of these patients were narcotic addicts and admitted to a fairly large alcohol consumption during the convalescent period. Thus, active reconditioning early during the convalescent period in this group did not lead to any delay in recovery or deleterious effects on the liver.

10681 HEPATITIS-ASSOCIATED ANTIGEN (HAA) IN POLAR AREAS. (E.) Skinhøj, P. (Bispbjerg Hosp., Copenhagen), A. McNair and I. Persson. *Scand. J. Infect Dis.* 3(3):255-256, 1971.

The frequency of hepatitis-associated antigen in Greenlanders and Icelanders was determined using gel electrophoresis. The observed frequency of antigen carriers in Greenlanders was 2.3% in a population of 870 with a marked incidence in the northern areas where the frequency was 3.3%. Of the 20 antigen-positive individuals, 13 were males, giving an incidence of 3.2% in males against 1.5% in females. No antibodies were found in the sera of 218 Icelandic and 600 Greenland subjects tested. The high incidence of antigen in the Greenlanders appears to support a theory of a frequent nonparenteral transmission in areas with poor social and hygienic conditions.

10682 MODIFIED ACUTE CANINE VIRAL HEPATITIS. A MODEL FOR PHYSIOLOGIC STUDY. (E.) Morris, T. Q. (Columbia U. Coll. Physicians Surg., New York, N. Y.) and D. J. Gocke. *Proc. Soc. Exp. Biol. Med.* 139(1):32-36, 1972.

The authors describe a reliable method for the production of a modified form of acute infectious canine hepatitis (IC_4) characterized by anorexia, fever, lethargy, elevation of serum enzymes, BSP retention, clotting disorders, and a protracted course leading to recovery. Experimental animals were mongrel dogs, raised in isolation, which received an inoculation of 300 $TCID_{50}$ of the virus (prepared from infected liver homogenates) into the anterior chamber of the topically-anesthetized eye. Hepatitis with a severe and protracted course (most severe at 7-10 days, with recovery ensuing by the end of 3 weeks) was produced in 6 of 7 dogs, while the last died on day 7 with severe hepatitis and upper gastrointestinal bleeding. At a time of only slight impairment of hepatic function (as measured by the fractional clearance of BSP), dogs were injected with hyperimmune antisera obtained from an adult dog which had been repeatedly inoculated with the infectious canine hepatitis virus. Prior to infection and until administration of the antisera, sera from all dogs were free of neutralizing antibody to the hepatitis virus; thereafter, antibody titers of greater than 1:500 were found in all serum samples.

10683 DETECTION OF HEPATITIS ASSOCIATED ANTIGEN BY THE LATEX AGGLUTINATION TEST. (E.) Leach, J. M. (Pfizer Ltd., Sandwich, Kent, England) and B. J. Ruck. *Br. Med. J.* 4(5787):597-598, 1971.

The latex agglutination test works well with serum or plasma that has been stored at 4°C for 24 hr, but very fresh plasma may cause nonspecific agglutination. No agglutination was seen when whole blood or whole lysed blood was used. The test was evaluated on a panel of 60 sera from NIH, a panel of 28 hepatitis-associated antigen-positive sera collected for antigen purification, and on a total of 551 sera collected from presumed normal volunteers. The latex test has a sensitivity comparable to counter-current immuno-electrophoresis technique and nearly equal to the complement-fixation test. The test, utilizing antiserum from guinea pigs immunized with the antigen, is extremely rapid, making it valuable in screening blood donors before bleeding.

10684 PERSISTENT ANICTERIC HEPATITIS WITH AUSTRALIA ANTIGEN IN PATIENTS WITH DOWN'S SYNDROME. (E.) Sutnick, A. I. (Inst. Cancer Res., Philadelphia, Pa.), W. T. London, B. S. Blumberg and B. J. S. Gerstley. *Am. J. Clin. Pathol.* 57(1):2-12, 1972.

Forty-three patients with Down's syndrome in whom Australia antigen was detected in the first testing, had persistent antigen for the 2-5 yr follow-up. This persistence was greater than that in patients with acute hepatitis or leukemia. Significant differences were also seen in SGPT, SGOT, cephalin flocculation, thymol turbidity, total protein, serum albumin and BSP retention between patients with Down's syndrome with and without Australia antigen. With the exception of BSP retention and SGOT, similar differences were seen between Down's patients with the antigen and mentally retarded patients with diagnoses other than Down's syndrome. The presence of Australia antigen was associated with histologic abnormalities on biopsy of the liver, although some patients with persistent antigen showed no signs of hepatic disease. Institutionalized patients with Down's syndrome probably represent a previously unsuspected reservior of an agent responsible for human viral hepatitis.

10685 A STUDY OF AUSTRALIA ANTIGEN AND ITS CORRESPONDING ANTIBODY IN PATIENTS WITH VIRAL HEPATITIS AND CIRRHOSIS OF THE LIVER. (Fr.) Geffroy, Y. (C. Nicolle Hosp., Rouen, France), R. Colin, B. Paillot and M. Segrestin. *Arch. Fr. Mal. App. Dig.* 60(12):673-675, 1971.

Australia antigen was demonstrable in 34 of 75 patients with virus hepatitis (45.4%), including 21 of 30 (70%) of those with a history of transfusion or parenteral injection during the preceding 6 months and 14 of 45 (31.2%) of those without such a history. In terms of a different subgrouping, it was found in 18 of 52 (34.6%) of those who experienced a favorable outcome within 3 months; 15 of 22 (68%) of those who did not. The antigen was also demonstrable in 2 of 7 patients with jaundice secondary to alcoholic cirrhosis of the liver, 3 of 11 with posthepatic cirrhosis, none of 60 with alcoholic cirrhosis but no jaundice, none of 3 with biliary cirrhosis, not in the 1 with cardiac cirrhosis and none of 6 with cirrhosis of undetermined origin.

10686 VIRAL HEPATITIS, AUSTRALIA ANTIGEN AND PERIARTERITIS NODOSA. (Fr.) Geffroy, Y. (CHR Clin. Med. Serv., Rouen, France), M. Segrestin, R. Colin, J. Hemet and G. Cayron. *Arch. Fr. Mal. App. Dig.* 60(12):685-687, 1971.

Two months after i.m. injection of gamma globulin for acute urticaria, a 38-yr-old man developed persistent fever, myalgia, arthralgia and progressive weight loss and asthenia. At the time of hospitalization, 1 month later, an association of cytolytic viral hepatitis with periarteritis nodosa was confirmed by liver and muscle biopsies, with the latter demonstrating the presence of necrosing panarteritis. At the time of admission, Australia antigen was demonstrated twice, at a 7-day interval, but could not be demonstrated in 3 subsequent attempts. It is suggested that the periarteritis nodosa was secondary to the hepatitis, rather than a concurrent disorder.

10687 AUSTRALIA ANTIGEN, VIRAL HEPATITIS AND PERIARTERITIS NODOSA. (Fr.) Trepo, C. (Red Cross Hosp., Lyon, France) and M. Girard. *Arch. Fr. Mal. App. Dig.* 60(12):687-688, 1971.

In 7 patients (6 of 7 reported previously), Australia antigen was demonstrable in the presence of periarteritis nodosa alone (4 of 7) or associated with hepatitis (2 of 7) or biliary cirrhosis (1 of 7). In 5 of 7 some form of transient hepatic dysfunction had been evidenced prior to the presenting illness. In 3 of 7, a strong probability of contagion was suggested by the history, including 1 patient whose wife was found to be a healthy carrier of the antigen. In a correlative study, Australia antigen was demonstrated in the sera of 3 of 11 patients presenting with periarteritis nodosa.

10688 ANTIGEN ASSOCIATED WITH HEPATITIS IN CASES OF SUBACUTE AND CHRONIC HEPATITIS AND IN PATIENTS WITH CIRRHOSIS. (Fr.) Demeulenaere, M. (U. Ghent Intern. Med. Serv., Belgium). *Arch. Fr. Mal. App. Dig.* 60(12): 670-672, 1971.

Australia antigen was demonstrable in 5 of 108 patients with subacute Type A virus hepatitis; 12 of 20 with Type B; 6 of 10 in whom the type could not be established; 19 of 54 with chronic hepatitis; none of 9 with hepatitis secondary to infection; 22 of 48 with postnecrotic cirrhosis of the liver; 3 of 22 with septal cirrhosis; none of 3 with primary biliary cirrhosis. In cirrhotic patients only, the persistent presence of the antigen was associated with rapid development of decompensation; its absence, with significantly slower development in this respect; its periodic appearance and disappearance, with intervals of exacerbation and improvement, resp.

10689 AUSTRALIA ANTIGEN AND THE DEMONSTRATION OF HEPATIC DISORDERS IN A POPULATION OF BLOOD DONORS. CLINICAL AND BIOLOGIC STUDIES. BIOLOGIC FOLLOW-UP OF SEVERAL TRANSFUSED SUBJECTS. (Fr.) Migeotte, P. (Inst. Med., Liege, Belgium), M. Otto-Servais, J. Brocteur, G. Plomteux, L. Tuyters, C. Heusghem and A. André. *Arch. Fr. Mal. App. Dig.* 60(12):637-648, 1971.

Increased levels of SGOT, SGPT and ornithine carbamyl transferase were found in 6.3% of 5397 blood donors at a Belgian medical center, while 0.2% of those also tested routinely for Australia antigen showed the presence of the antigen. In a group which was studied in greater depth, serum enzyme levels were normal in 9 of 50, in the presence of the antigen, suggesting that they were healthy carriers. Enzyme levels were increased significantly in the rest of the study group: in the presence of the antigen, in 15 of 41; in its absence, in 26 of 41. Spontaneous normalization of all laboratory findings within 6 months suggested that 10 of 41 were suffering from mild, asymptomatic, viral hepatitis at the time of the screening tests. In 31 of 41, the lack of such normalization was accompanied by positive demonstration of some chronic liver disorder. In a follow-up study of transfused patients, all 3 who received blood from donors with Australia antigen (accompanied by increased serum enzyme levels, as above, in 2 of 3) developed both abnormalities within 8-12 weeks. Hepatitis also developed in 2 of 3. In 2 of 9 who received blood from donors with increased serum enzyme levels but no Australia antigen, similarly increased enzyme levels developed within 3 and 5 weeks, resp. In an additional 1 of 9, an anti-Australia antibody was demonstrable, 13 weeks after transfusion.

10690 POLYARTERITIS ASSOCIATED WITH AUSTRALIA ANTIGEN-POSITIVE HEPATITIS. (E.) Baker, A. L. (Tufts-New England Med. Ctr., Boston), M. M. Kaplan, W. C. Benz, J. S. Sidel and H. J. Wolfe. *Gastroenterology* 62(1):105-110, 1972.

A 30-yr-old registered nurse, with a 4-mo history of tiredness, developed migratory polyarthritis, daily fever to 102°F, and a transient pretibial maculopapular rash, 2 weeks prior to admission. Abdominal examination was normal except for tenderness to deep palpation in right upper quadrant. Laboratory studies confirmed the suspicion of hepatitis: serum positive for Australia antigen, elevated SGOT, and SGPT and alkaline phosphatase. Two weeks later, a transient, painful, red nodule appeared on her left elbow associated with paresthesias and numbness in the left ulnar nerve distribution. A biopsy of the left ulnar musculature revealed marked inflammation of the medium-sized arteries consistent with polyarteritis. Australia antigen was detected in involved arteries by immunofluorescence, using fluorescein-labeled, purified antibody to Australia antigen. Arteritis was probably due to deposition in arteries of immune complexes formed by Australia antigen and antibody.

10691 PERIARTERITIS NODOSA, AUSTRALIA ANTIGEN AND LYMPHATIC LEUKEMIA. (E.) Gerber, M. A., A. Brodin, D. Steinberg, S. Vernace, C.-P. Yang and F. Paronetto (Mt. Sinai Sch. Med., New York, N. Y.). *N. Engl. J. Med.* 286(1):14-17, 1972.

A 29-yr-old female presented with petechiae, ecchymoses and hepatosplenomegaly. With a diagnosis of acute lymphatic leukemia she was treated with vincristine, prednisone and platelet transfusions and later with cyclophosphamide. She was readmitted 4 months later with abdominal discomfort, shortly after her husband had been hospitalized with hepatitis, without demonstration of Australia antigen in his blood. Her liver transaminases were elevated, while alkaline phosphatase and bilirubin were normal. Her serum was strongly positive for Australia antigen and she was discharged 1 month later with normal transaminase levels. She was readmitted 1 month later with severe abdominal pain and vomiting. Bowel sounds were normal, there was no hepatosplenomegaly, but there was suprapubic tenderness. Some liver enzymes were elevated and the serum was strongly positive for Australia antigen. There were no circulating immune complexes in the serum. Pain persisted for 3 weeks and exploratory laparotomy revealed the entire small intestine (Ligament of Treitz to distal ileum) showing patchy necrosis. She died 1 month later. Gross and light microscopic examination showed the vascular abnormalities of periarteritis nodosa and Australia antigen was detected in these localized lesions in the absence of immunoglobulins or complement. Fluorescent-antibody examination showed both IgG and Australia antigen in hepatocellular nuclei.

10692 TWO CASES OF TRUE HETEROTOPIC TRANSPLANT OF BABOON LIVER INTO PATIENTS WITH ACUTE FULMINATING HEPATITIS. (Fr.) Pouyet, M. and P. Berard. *Lyon Chir.* 67(4):288-291, 1971.

A 28-yr-old woman with acute, fulminating hepatitis had fallen into coma, accompanied by severe EEG abnormalities and acute respiratory difficulties. Two days after the apparently successful transplant of a baboon liver, a biopsy puncture of the transplant was followed by hemothorax and massive hemoperitoneum, although necropsy suggested that the transplant was essentially normal histologically. When a 34-yr-old woman with the same disorder, also in coma, received a similar transplant, she died on the following day. In this case autopsy findings confirmed acute rejection of the transplant.

10693 ANTIBODY AGAINST SERUM-HEPATITIS ANTIGEN. PREVALENCE AND POTENTIAL USE AS IMMUNE SERUM GLOBULIN IN PREVENTION OF SERUM-HEPATITIS INFECTIONS. (E.) Prince, A. M. (New York Blood Ctr., N. Y.), W. Szmuness, K. R. Woods and G. F. Grady. *N. Engl. J. Med.* 285(17):933-938, 1971.

The recent discovery that three 10 ml doses of conventional gamma globulin was without merit in the prevention or modification of serum hepatitis (SH, Australia/HAA) has increased the search for agents that may be specific in the prevention of serum hepatitis. Serum hepatitis antibody content of conventional, convalescent, and hyperimmune gamma globulin were determined by the passive hemagglutination method; a highly sensitive assay method. Serum hepatitis antibody was detected at low titer in conventional gamma globulin (less than 1:2 to 1:64) in contrast to 1:512,000 in hemophilic plasma containing serum hepatitis immune globulin precipitating antibody. Injection of serum hepatitis immune globulin in controlled institutional studies caused the appearance of serum hepatitis antibody that remained detectable for 2 months in 50% of the patients. Antibody levels were due to the passive administration of serum hepatitis immune globulin. It is necessary to approach the use of serum hepatitis immunoglobulin with care and caution because the risk of the chronic carrier state and the nature of hepatic damage has not been defined.

10694 IMMUNOSUPPRESSION, LIVER INJURY, AND HEPATITIS IN RENAL, HEPATIC, AND CARDIAC HOMOGRAFT RECIPIENTS: WITH PARTICULAR REFERENCE TO THE AUSTRALIA ANTIGEN. (E.) Torisu, M. (U. Colorado Sch. Med., Denver), T. Yokoyama, H. Amemiya, P. F. Kohler, G. Schroter, G. Martineau, I. Penn, W. Palmer, C. C. Halgrimson, C. W. Putnam and T. E. Starzl. *Ann. Surg.* 174(4): 620-639, 1971.

Blood samples from 225 normal volunteers, 83 renal homograft recipients, 10 liver replacements, and one cardiac recipient were investigated for Australia (Au) antigenemia. A comparison was made of the effectiveness of hepatic detection tests in immunosuppressed patients and their clinical course followed. Sensitive complement fixation tests detected Au antigenemia in 28% of the patients. This antigenemia persisted and these organ recipients became infectious carriers, accounting for the high incidence of hepatitis in those that care for these patients. Liver disease that follows renal transplantation is not associated with the presence or absence of Au antigen. Anti-complementary activity was elevated in asymptomatic and symptomatic Au antigen carriers with renal transplants. Anti-complementary activity was never abnormal in Au antigen-negative individuals. Liver recipients with and without Au antigenemia had elevated anti-complementary activity titer. A patient dying of chronic aggressive hepatitis, Au positive, had liver replacement followed by immunosuppressive therapy. Au antigen disappeared within minutes of host hepatectomy and suggested the liver as a primary source. Au antigen returned 80 days after transplantation. Recurrent hepatitis was diagnosed and the patient is Au antigen positive 8 months after transplantation.

10695 POST-TRANSFUSION HEPATITIS - EFFECT OF MODIFIED GAMMA GLOBULIN ADDED TO BLOOD IN VITRO. (E.) Katz, R., J. Rodriguez and R. Ward (Child. Hosp., Los Angeles, Calif.). *N. Engl. J. Med.* 285(17):925-932, 1971.

The incidence of post-transfusion hepatitis with jaundice was significantly reduced in patients receiving modified gamma globulin added to blood before transfusion when compared with controls receiving unmodified blood. Five patients of a total of 1,970 patients receiving gamma globulin with blood acquired icteric hepatitis but no severe cases were observed while 18 of 2019 patients given blood without gamma globulin developed hepatitis with 6 severe cases and 2 deaths. A third group of 2137 patients received no blood, one person developed icteric hepatitis. The incidence of anicteric hepatitis was the same in the 2 blood-receiving groups. The overall difference between those receiving modified gamma globulin and the controls could have occurred by chance-alone only once in 100 times. Standard gamma globulin was modified by hydrolysis; 10 ml of 6% solution of gamma globulin was added to each unit of blood prior to transfusion. No adverse reaction to i.v. use of modified gamma globulin was noted. This procedure was superior to that of i.m. injection of gamma globulin following transfusion.

10696 AUSTRALIA/SH ANTIGEN: APPLICATION OF IMMUNODIFFUSION AND COMPLEMENT FIXATION TESTS TO A CONSECUTIVE SERIES OF PATIENTS WITH ACUTE AND CHRONIC VIRAL HEPATITIS. (E.) Hersh, T. (Brown U. Rhode Island Hosp., Providence), N. Sakurada and J. Melnick. *Am. J. Gastroenterol.* 57(2):109-119, 1972.

A study was made of the sera from 137 patients with viral hepatitis, 20 with chronic active hepatitis, 8 with anicteric hepatitis, 50 controls with other liver disease, and in 11 drug addicts for Au/SH antigen. Each sample, a frozen admissions sample plus additional consecutive samples, was tested by immunodiffusion and by complement fixation techniques. Standard serum determinations were also performed. Two-thirds of the patients with clinical serum hepatitis and 28% with a diagnosis of infectious hepatitis had a positive test for Au/SH antigen, usually by both techniques. Of 8 addicts with a diagnosis of anicteric hepatitis, 6 were positive whereas 7 of 20 patients with chronic active hepatitis had Au/SH antigen. None of the 50 patients with other diseases of the liver were Au/SH-positive by either test. The detection of antigen was noted in the initial sample of sera of the patients with acute viral hepatitis and became negative as the jaundice and other tests reverted to normal. Anticomplementary activity was present in sera of 25 hepatitis patients and decreased as the icterus developed and was sometimes detected in the convalescent sera. The occurrence Au/SH antigen in the blood of drug addicts with subclinical hepatitis makes it imperative that a more sensitive and rapid screening test be developed since immunodiffusion alone did not detect the antigen in all cases.

10697 IMPLICATIONS OF RED CELL WASHING FOR HEPATITIS TRANSMISSION. (E.) Hinman, J. (Blood Res. Inst., Boston, Mass.) and J. L. Tullis. *Vox Sang.* 20(5):440-441, 1971.

10698 IMMUNOPATHOLOGIC REACTIONS IN ACUTE AND CHRONIC DISEASES OF THE LIVER WITH SPECIAL REFERENCE TO HEPATITIS ASSOCIATED ANTIGEN (HAA). (Ger.) Berg, P. A. (Univ. Med. Klin. Tubingen, Germany). *Therapiewoche* 21(34): 2328-2335, 1971.

10699 AUSTRALIA ANTIGEN IN SINGAPORE. I. FREQUENCY IN BLOOD DONORS. (E.) Ong, Y. W. (U. Singapore Sch. Med.), S. B. Kwa and C. S. Ying. *Singapore Med. J.* 12(4):189-192, 1971.

10700 THE ROLE OF HOSPITALIZATION IN THE PREVENTION OF SECONDARY INTRAFAMILIAL CASES OF VIRAL HEPATITIS. (Pol.) Gajda, A. (Med. Acad. Inst. Infect. Dis., Gdansk, Poland). *Przegl. Epidemiol.* 25(2):299-301, 1971.

10701 VALUE OF BLOOD AMMONIA DETERMINATIONS IN ACUTE FULMINANT HEPATITIS. (Fr.) Imler, M. (CHU Med. Clin. B, Strasbourg, France), R. Bockel, B. Peter and J. Stahl. *Schweiz. Med. Wochenschr.* 101(32):1161-1171, 1971.

10702 EVOLUTION OF LACTOISOENZYME DETERMINATIONS IN FIVE CASES OF ACUTE HEPATITIS. (Sp.) Vazquez Cano, J. A. (La Paz City Sanit., Madrid) and J. Martin Villar. *Rev. Diagn. Biol.* 20(4):439-448, 1971.

10703 RED CELL SURVIVAL IN ACUTE HEPATITIS. (Dan.) Enk, B. (Frederiksberg Hosp., Copenhagen) and T. Friis. *Nord. Med.* 86(40): 1148-1150, 1971.

10704 RELATIONSHIP OF HEPATITIS ASSOCIATED ANTIGEN (H.A.A.) TO ACUTE AND CHRONIC LIVER INJURY. (E.) Dudley, F. J. (Roy. Free Hosp., London), R. A. Fox and S. Sherlock. *Lancet* 2(7714):1-3, 1971.

10705 HEPATITIS ASSOCIATED ANTIGEN (AUSTRALIA ANTIGEN) IN MASSACHUSETTS BLOOD DONORS. (E.) Kliman, A. (Massachusetts Red Cross Blood Program, Boston), N. R. Reid, C. Lilly and J. Morrison. *N. Engl. J. Med.* 285(14):783-785, 1971.

10706 AUSTRALIA ANTIGEN: PHYSICAL AND CHEMICAL PROPERTIES. (E.) Millman, I. (Inst. Cancer Res., Philadelphia, Pa.), H. Hutanen and F. Merino. *Res. Commun. Chem. Pathol. Pharmacol.* 2(4-5):667-686, 1971.

10707 THE INCIDENCE OF AUSTRALIA ANTIGEN IN BLOOD DONORS AND IN CERTAIN HIGH RISK PATIENT POPULATIONS. (E.) Nelson, M. (Australian Red Cross Soc. Blood Transfus. Serv., Sydney) and B. Cooke. *Med. J. Aust.* 1(18):950-954, 1971.

10708 SIX CASES OF POSTHEPATITIS BONE MARROW APLASIA. (It.) Perugini, S. (Univ. Inst. Med. Pathol., Pavia, Italy), A. Morini, G. Fontana and A. U. Di Prisco. *Minerva Med.* 62(59-60):2884-2891, 1971.

10709 PROTEOLYTIC ACTIVITY OF FECES IN VIRUS HEPATITIS. (Pol.) Halawa, B. (Med. Acad. Inst. Intern. Dis., Wroclaw, Poland) and A. Gladysz. *Pol. Tyg. Lek* 26(33):1274-1276, 1971.

10710 USE OF PEPSIN-TREATED HEPATITIS ASSOCIATED ANTIGEN IN THE PRODUCTION OF PRECIPITATING ANTIBODY. (E.) Kim, C. Y. (City Hosp., Boston, Mass.), J. Spano and G. E. Clark. *J. Infect. Dis.* 124(4):411-414, 1971.

10711 THE AUSTRALIA ANTIGEN AND ACUTE HEPATITIS. PRELIMINARY STUDY IN SPORADIC CASES OF ACUTE VIRAL HEPATITIS OBSERVED IN LISBON. (Por.) Moura, M. C. (Univ. Pathol. Med. Clin., Lisbon, Portugal) and M. B. O. Abreu. *J. Med. (Porto)* 76(1492):591-598, 1971.

10712 AUSTRALIA ANTIGEN AND ANTINUCLEAR FACTORS: ASSOCIATION IN A PATIENT WITH HEPATIC DISEASE AND A BLOOD DONOR. (Ger.) Sennekamp, J. (Univ. Med. Clin., Bonn, Germany), B. Eggeling and H. Otten. *Dtsch. Med. Wochenschr.* 96(39):1540-1541, 1971.

10713 HEPATITIS PRESENTING AS TRANSIENT URTICARIA. (E.) Ljunggren, B. (U. Lund. Dept. Dermatol., Malmo) and H. Moller. *Acta Derm. Venereol. (Stockh.)* 51(4):295-297, 1971.

10714 SERUM COLLAGEN-LIKE PROTEIN IN PATIENTS WITH CHRONIC LIVER DISEASE. (E.) Hirayama, C. (Kyushu U. Sch. Med. Fukuoka, Japan), M. Kawabe, I. Morotomi and N. Kimura. *Digestion* 5(1):31-39, 1972.

Hot trichloracetic acid extraction was a reliable method for the determination of serum collagen-like protein. This protein behaved as a macromolecular form and migrated electrophoretically in the beta - gamma - globulin region. In patients with chronic liver diseases, the serum levels of collagen-like protein did not reflect the grade of hepatic fibrosis but the activity of hepatic fibrosis. The highest level of collagen-like protein was found in sera of chronic active hepatitis. Thus serum levels of this protein may be a useful parameter in the diagnosis of the active process of hepatic fibrosis. Serum collagen-like proteins are not elevated in liver disease as a result of decreased breakdown.

10715 IMMUNOSUPPRESSIVE THERAPY AND MODERATELY ACTIVE, AGGRESSIVE, CHRONIC HEPATITIS OR MODERATELY ACTIVE, NON-ALCOHOLIC CIRRHOSIS. (Fr.) de Groote, J. (St. Raphael Acad. Hosp., Leuven, Belgium), J. Fevery and J. Vandenbroucke. *Arch. Fr. Mal. App. Dig.* 60(12):664-669, 1971.

Australia antigen was demonstrable in 14 of 27 patients with chronic hepatitis, but only in 1 of 12 with non-alcoholic cirrhosis. Following an unspecified period of medication with azathioprine or a combination of azathioprine (50-100 mg per dose) and prednisone (15-20 mg per dose) all laboratory findings were normal in 10 of 27 hepatitis and 3 of 12 cirrhotic patients, with no apparent difference exerted by the presence or absence of the antigen. Recurrences were seen in 5 of 9 hepatitis patients whose liver biopsies were essentially normal at the time medication was terminated. Recurrence was also seen in 1 of 7 cirrhotic patients in whom medication was terminated in the presence of continued, presumably residual, hepatic dysfunction. Two illustrative case histories are cited.

10716 CHRONIC AGGRESSIVE HEPATITIS. PORCELAIN GALLBLADDER. PANCREATITIS. CHRONIC PYELONEPHRITIS. (Sp.) Padilla, M., P. Borbujo and T. Serrano. *Rev. Esp. Enferm. Apar. Dig.* 35(6):667-672, 1971.

A 71-yr-old woman presented with all 4 disorders simultaneously, complicated by hepatic and pancreatic insufficiency. Following 8 months of limited improvement in response to treatment, she died in irreversible hepatic coma.

10717 PERSISTENT, FULMINANT WATERY DIARRHEA COMPLICATING CHRONIC ACTIVE HEPATITIS. (E.) Keusch, G. T., M. M. Kaplan (Tufts-New England Med. Ctr., Boston, Mass.), D. Smith and P. Ravanesi. *Gastroenterology* 62(2):307-313, 1972.

A single case is presented of a 52-yr-old nurse who presented with painless jaundice, intermittent pruritus and a 15-pound weight loss over at least 12 months. A percutaneous needle biopsy of the liver showed chronic aggressive hepatitis with early cirrhosis and she was discharged on 30 mg/day of prednisone. Liver function tests failed to improve and, 4 weeks later, prednisone was increased to 45 mg/day. With no response after 3 months, prednisone was tapered and she was placed on 150 mg/day of azathioprine for 1 year. With increasing hepatomegaly and the onset of splenomegaly a repeat liver biopsy showed marked progression to postnecrotic cirrhosis. Azathioprine was discontinued and she continued asymptomatic for 18 months on no medication, returning with clinical jaundice, fatigue and anorexia. Four months later (4 yr after initial presentation) she developed severe diarrhea and was admitted several weeks later in deep coma. On examination she was deeply jaundiced, afebrile and dehydrated. Laboratory data were consistent with a decreased extracellular fluid space secondary to diarrhea and she had a hypokalemia metabolic acidosis. Stools were negative for enteric pathogens, ova and parasites and occult blood. During the first 24 hr she received 4 liters of i.v. fluid, 160 mEq KCl and 180 mEq $NaHCO_3$, with considerable laboratory improvement but only slight clinical improvement. She also received neomycin, 1 g every 6 hr by nasogastric tube. Despite opiates and anticholinergics, she continued to have 6-16 watery stools daily. Stool volumes and electrolytes were consistent with Vibrio cholerae. X-ray studies and small intestine biopsy showed diffuse inflammation of the small intestine. She improved rapidly with steroids, but her diarrhea exacerbated when steroids were stopped. Reinstitution of steroids led to slight improvement, followed by gastrointestinal bleeding and hepatic encephalopathy. She died 15 weeks after hospitalization and autopsy revealed postnecrotic cirrhosis and sequelae of portal hypertension.

10718 THE OCCUPATIONAL FACTOR IN CHRONIC VIRAL HEPATITIS. (Rum.) Pappo, A. (N. Gh. Lupu Inst. Intern. Med., Bucharest, Rumania), V. Lazarescu and C. Miron. *Viata Med.* 18(16):745-747, 1971.

10719 CLINICAL SIGNIFICANCE OF HAPTOGLOBIN IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS OF VIRAL ETIOLOGY. (Rus.) Denisenko, L. N. (Med. Inst. Sanit. Hyg., Leningrad, USSR). *Ter. Arkh.* 43(10):38-41, 1971.

10720 TREATMENT OF CHRONIC ACTIVE HEPATITIS WITH D-PENICILLAMINE. (Ger.) Lange, J. (City Hosp., Gummersbach, Germany), K. Schumacher and H. P. Witscher. *Med. Welt* 22(47):1880-1881, 1971.

10721 OXYPHENISATIN AND CHRONIC ACTIVE HEPATITIS. (E.) Mallory, A. (U. Colorado Med. Ctr., Denver), B. W. Frank and F. Kern, Jr. *N. Engl. J. Med.* 285(22):1266, 1971.

10722 MORBID CHANGES IN THE KIDNEYS IN CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER. (Rus.) Shulutko, B. I. (Med. Inst. Hyg. Sanit., Leningrad, USSR). *Klin. Med. (Mosk.)* 49(8):64-69, 1971.

10723 CHRONIC ACTIVE HEPATITIS. (Por.) Tome Ribeiro, A. (Sch. Med., Porto, Portugal). *Medico (Porto)* 59(1033):978-985, 1971.

10724 ACTIVE CHRONIC HEPATITIS AND HAEMOLYTIC ANAEMIA ASSOCIATED WITH Rh SPECIFIC ANTIBODIES. (E.) Pengelly, C. D. R. (62 Manchester Rd., Altrincham, England) and R. C. Jennings. *Postgrad. Med. J.* 47(552):683-686, 1971.

See also number: 10688

CIRRHOSIS

10725 A CLINICAL INVESTIGATION OF THE PORTACAVAL SHUNT: V. SURVIVAL ANALYSIS OF THE THERAPEUTIC OPERATION. (E.) Jackson, F. C. (VA Dept. Med. Surg., Washington, D. C.), E. B. Perrin, W. R. Felix and A. G. Smith. *Ann. Surg.* 174(4): 672-701, 1971.

A 9-yr study of 155 patients in various Veteran's Administration hospitals in the United States indicates that the stabilized cirrhotic patient has a more favorable opportunity for survival if he receives a portacaval shunt. Patients were randomly selected and assigned to a medical or surgical therapy group in keeping with the best interests of the patient. Patients whose clinical state required reassignment were excluded from the final tabulation. An average follow-up of 5.5 yr showed 46 of 155 patients living. Only 28 of 77 (36%) of the medical treatment group had survived while 44 of 78 (57%) of the portacaval shunt surgical group had. Rehemorrhage was the most lethal complication in both groups. Encephalopathy among diabetic cirrhotics was uniformly fatal and was a threat to life irrespective of treatment. The rate of failure for the shunt was 8%. Portal pressure in excess of 30 mm Hg caused rebleeding in all cases. Recent ascites is not related to rebleeding. Shunt patients do not have a higher incidence of peptic ulceration. Hypersplenism does not affect the survival among the patient groups.

10726 PORTACAVAL ANASTOMOSES CARRIED OUT UNDER MANOMETRIC CONTROL. POSTOPERATIVE ANGIOGRAPHIC STUDY. (Fr.) Marion, P. (Cardiovascular Hosp., Lyon, France), D. Lapeyre, A. Rubet, F. Pinet, S. Estanove and M. George. *Lyon Chir.* 67(4):257-259, 1971.

A technique is described for ensuring that the portacaval gradient, following laterolateral portacaval anastomosis, is maintained at a level at least equal to its original value. The technique was employed in 5 patients with hemorrhagic portal hypertension secondary to intrahepatic block which was due to cirrhosis of alcoholic or uncertain origin. One of 5 died shortly after surgery of intercurrent pneumonia. At the time of report, 4 of 5 were in apparent good health, after unspecified intervals, except for residual splenomegaly in 1 of 4. Also cited are 3 case histories of patients who developed psychic disturbances (severe confusional syndrome and/or diurnal somnolence) following reversal of the portal circulation after splenorenal (1 of 3) or portacaval (2 of 3) anastomosis. To effect the manometric control, the anastomosis is clamped. The pressure is taken simultaneously in the portal and caval vein. The portacaval gradient thus noted is compared with the figures obtained during splenoportagraphy and subhepatic catheterization performed before intervention. The anastomosis is unclamped, the pressure catheters remaining in place. Several minutes are required for the pressure to stabilize. The new portacaval gradient is determined. The anastomosis is then tightened with a nonresorbable thread until the portacaval gradient is restored to a level equal to its initial value.

10727 ENCEPHALOMYELOPATHY WITH HEPATIC CIRRHOSIS FOLLOWING PORTOSYSTEMIC VENOUS SHUNTS. (E.) Lefer, L. G. (Duke U. Med. Ctr., Durham, N. C.) and F. S. Vogel. *Arch. Pathol.* 93(2):91-97, 1972.

A 40-yr-old white man was in good health until the sudden onset of nausea, vomiting and abdominal pain. At the time of cholecystectomy for his cholecystitis and cholelithiasis, hepatomegaly was noted and an open biopsy revealed portal fibrosis. Liver function tests were normal. He was in good health until 2 yr later when he developed hematemesis, requiring gastrotomy and ligation of varices and 4 paracenteses for abdominal ascites. Two months later a splenorenal shunt was performed and postoperatively he developed lethargy and mild pneumonia which responded well to antibiotics and a low-protein diet. Blood ammonia was normal at this time as was the neurological examination. He presented 6 months later with weakness of the lower extremities. Despite normal brain scan, skull films and spinal tap he was readmitted the next month with recurrent episodes of confusion and lethargy. At this time his blood ammonia was 51.4 to 125 mg/100 ml and, after a grand mal seizure, he developed status epilepticus. He was treated with diphenylhydantoin, neomycin and a low-protein, high-carbohydrate diet and discharged. He was readmitted 2 months later disoriented combative, hallucinating, with scleral icterus and teleangiectasia over the chest, no papilledema, spastic paraplegia with cranial nerves intact and numerous pathological reflexes. He obtained some relief with anticonvulsants, diuretics and antibodies. Liver function tests revealed progressive hepatic failure and he died shortly. At autopsy there was seen to be demyelinination of the lateral corticospinal tracts, diffuse astrogliosis of the brain and unilateral degenerative changes within the globus pallidus. Axonal degeneration seemed primary, demyelination secondary.

10728 PORTACAVAL ANASTOMOSIS AND HEPATIC HEMOSIDERIN DEPOSITION: A PROSPECTIVE, CONTROLLED INVESTIGATION. (E.) Conn, H. O. (VA Hosp., West Haven, Conn.). *Gastroenterology* 62(1):61-72, 1972.

The frequency with which hemosiderosis develops in 103 cirrhotic patients with portal hypertension with and without portacaval anastomosis was studied in a prospective manner in conjunction with prospective studies of the value of prophylactic portacaval anastomosis. At the beginning of the study, stainable hemosiderin was observed in liver biopsies taken from 27% of the patients without portacaval anastomosis and 36% of the shunt group and was similar in amount in the 2 groups. At the conclusion of the study, an average of 45 months after the initial biopsy, hemosiderin was found in 27% of the control group and in 52% of the prophylactic shunt group. At the end of the study the average grade of hemosiderin was the same in the control group, but in the prophylactic shunt group a 3-fold increase over initial levels was observed. The 2 groups were similar with regard to age, type, duration and severity of cirrhosis, duration of follow-up, amount of orally administered iron, and number of transfusions. In 10 patients in whom excessive hepatic hemosiderin accumulation was observed (9 in the shunt group, 1 in the control group), hemosiderin deposition was noted in the heart, pancreas, kidney and adrenal. The type of portacaval anastomosis employed did not have an effect on the deposition of hemosiderin in these patients. Although the mechanism by which anastomosis increases hemosiderin deposition is not clear, other factors which increase iron absorption, such as pancreatitis and hemolysis, may contribute in the presence of excessive portal systemic shunting to the development of the syndrome of postshunt hemosiderosis.

10729 EFFECT OF NICOTINIC ACID ON FIBRINOLYTIC ACTIVITY IN HEALTH, IN THROMBOTIC DISEASE AND IN LIVER CIRRHOSIS. (E.) Robertson, B. R. (U. Lund Dept. Surg., Malmo, Sweden). *Acta Chir. Scand.* 137(7):643-648, 1971.

The effect of i.v. nicotinic acid on the fibrinolytic activity of the blood was studied in 18 cirrhotics, 6 patients with varices of the lower limb, and in 50 patients with deep venous thrombosis and/or superficial thrombophlebitis. A larger effect on fibrinolytic activity after i.v. nicotinic acid administration was noted in the controls as compared with patients with thrombosis and/or thrombophlebitis. The fibrinolytic activity increased in the controls by more than 50 mm^2 in 44 patients (78.6%); only 18 (36%) of the patients with venous thrombosis showed a similar increase. The mean increase for the controls was 174 mm^2, for the venous thrombosis patients 77 mm^2. All 18 patients with cirrhosis showed an increase of fibrinolytic activity greater than 50 mm^2 with a mean of 415 mm^2. There was no correlation between fibrinolytic activity and injection of nicotinic acid after venous occlusion in controls or in patients with venous thrombosis. No increase in fibrinolytic activity was noted at 45, 60 and 150 min in 10 volunteers who received, 1.2 g nicotinic acid orally. Fibrinolytic activity was increased in 7 of the 10 volunteers 8 min after i.v. administration. An increase in the fibrinolytic activity was noted in the 6 patients undergoing surgery for leg varices after i.v. nicotinic acid. Biopsy specimens revealed a slight increase of fibrinolytic activity in 3, in 1 a slight decrease, and no change in 2. In normals, plasminogen activator appears to be released from the available pool of damaged cells.

10730 HYPERALIMENTATION IN CIRRHOTIC PATIENTS. (E.) Host, W. R., O. Serlin and B. F. Rush, Jr. (New Jersey Coll. Med., Bergen). *Am. J. Surg.* 123(1):57-62, 1972.

The effect of hyperalimentation mixtures containing minimal amounts of sodium, potassium, and ammonia was evaluated in a group of cirrhotic patients. Metabolic acidosis must be carefully observed and usefulness of the mixture can be enhanced if methods can be developed to avoid precipitation of amino acids as hydrochloride salts or if alternative buffering such as potassium bicarbonate can be employed. Ammonia levels in cirrhotic patients rose from 108.2 μg% to 164 μg%, but were not associated with change in mental status or onset of asterixis. There was little variation in portal pressures from day to day. An unexplained elevation of SGPT and alkaline phosphatase levels occurred between the fifth and tenth days of therapy in 6 of 19 noncirrhotic patients with no history of liver disease; the elevations returned to normal as infusion continued. Preliminary histologic and electron microscopic evaluation revealed nonspecific changes noted also in starved and starved refed animals. Hyperalimentation solution seems capable of supporting nitrogen balance in cirrhotic patients.

10731 THE BEHAVIOUR OF INSULINAEMIA IN PATIENTS WITH LIVER CIRRHOSIS AFTER INTRAVENOUS ADMINISTRATION OF GLUCOSE, TOLBUTAMIDE AND GLUCAGON. (E.) Kasperska, T. (Med. Acad. 3rd Dept. Intern. Dis., Warsaw, Poland), J. Lawecki, H. Rogala and A. Czyżyk. *Diabetologia* 7(5):391-394, 1971.

Blood insulin level during fasting in 10 cirrhotics was normal, but after i.v. glucose (0.33 g/kg body weight) the increase in insulinemia was greater in these patients than in controls. The rise of insulinemia after tolbutamide administration (1.0 g) was significantly higher in the fifteenth and thirtieth min in cases of liver cirrhosis. After glucagon administration flattening of the blood glucose curve, characteristic of cirrhosis, was observed. Blood insulin levels on fasting and after glucagon injection (1 mg) were similar in both groups under comparison. Possible factors involved in the failure of glucagon to elicit hyperinsulinemia are reduced reactivity of adenyl cyclase to glucagon, decreased adenyl cyclase content in the pancreatic B-cells or reduced sensitivity of the insulin-releasing unit to cyclic-AMP.

10732 α-FETOPROTEIN IN INDIAN CHILDHOOD CIRRHOSIS. (E.) Nayak, N. C. (All India Inst. Med. Sci., New Delhi), V. Chawla, A. N. Malaviya and R. K. Chandra. *Lancet* 1(7741): 68-69, 1972.

Subjects consisted of 42 children (5-42 months) with Indian childhood cirrhosis and 28 controls (3-36 months) with various other diseases. Diagnosis was confirmed in each case by histologic examination of liver specimens obtained by percutaneous biopsy, and α-fetoprotein was tested for by the standard agar-gel double-diffusion technique of Ouchterlony. The α-fetoprotein was detected in the serum of 19 children (45%) with Indian childhood cirrhosis, only 2 of whom were less than 1 yr old while the other 17 had a mean age of 20.4 months (range of 12-42 months). Only 2 of 28 controls (7%) had detectable α-fetoprotein in their serum; one, aged 3 months was the sibling of a patient with Indian childhood cirrhosis while the other had neonatal hepatitis.

10733 MECHANISM OF INCREASED RENAL TUBULAR SODIUM REABSORPTION IN CIRRHOSIS. (E.) Chaimovitz, C., P. Szylman, G. Alroy and O. S. Better (Rambam Govt. Hosp., Haifa, Israel). *Am. J. Med.* 52(2):198-202, 1972.

Subjects consisted of 4 patients with cirrhosis and ascites (3 with liver biopsies) and 4 normal males. Three of the patients had an impaired capacity to dilute urine after a standard p.o. water load while the fourth achieved normal rates of urinary flow and minimal urinary concentration. All 8 subjects were on a daily diet of 70 g protein and 60 mEq sodium and all medications were stopped 5 days before the study. On the morning of the study, each received a p.o. water load of 20 ml/kg over 40 min. With the patients recumbent during the entire study (except for voiding) a hypotonic saline diuresis was induced with the i.v. infusion of 0.45% NaCl. The initial infusion rate was 5 ml/min and this was adjusted continuously so as to exceed urinary flow by 5 ml/min. After an appropriate priming dose, a sustaining infusion of inulin and para-aminohippurate in normal saline solution was given at a rate of 1 ml/min. The glomerular filtration rate was somewhat lower in cirrhotics (82 ml/min) than in normals (116 ml/min) but this difference was not significant. Urine osmolarity, at maximal free water clearance value, was lower in cirrhotics (72.7 mOsm/kg) than in normals (121 mOsm/kg). Free water clearance was 9.2 and 7.0 ml/min/100 ml glomerular filtration rate in cirrhotics and normals, resp. The sodium clearance was lower in cirrhotics than in normals, with values of 0.4 and 2.1 ml/min/100 ml glomerular filtration rate. The fractional distal sodium load did not differ between the 2 groups. It is concluded that the ratio of the clearance of water to that of the clearance of water plus the clearance of sodium can be used as a reasonable index of the fraction of sodium supply reabsorbed in the distal nephron; this was significantly greater in cirrhotics (96%) than in normals (73%).

10734 BRAIN ABSCESS DUE TO Listeria monocytogenes IN A PATIENT WITH CIRRHOSIS OF THE LIVER. (E.) Halkin, H. (Chaim Sheba Med. Ctr., Tel Aviv), I. J. Shacked and G. Altmann. *Isr. J. Med. Sci.* 7(10):1192-1195, 1971.

A 53-yr-old man receiving barbiturates for epilepsy since childhood was admitted with progressive abdominal swelling. Liver function tests, together with demonstration of esophageal varices on x-ray, led to a diagnosis of cirrhosis and he was maintained on diuretics. Massive hematemesis occurred 16 months later and was managed conservatively. Manifestations of portosystemic encephalopathy first appeared 4 months later and responded to a low-protein diet and neomycin. He was readmitted 3 months later with a 1-week history of weakness of the left arm and leg, and was somnolent and mildly disoriented at this time. Skull films were normal and the spinal tap yielded acellular, sterile, xanthochromic fluid with elevated protein. On day 6 anisocoria was noted, with the right pupil dilated and unresponsive, but there was no papilledema or change in neurologic status. The EEG was markedly asymmetrical with irregular δ-waves over the right temporорarietal area, and carotid angiography revealed an avascular mass within the right cerebral hemisphere. At the time of right parietal crainiotomy, soft, semiliquid necrotic brain tissue was aspirated leaving a 6 X 6 cm cavity in the parietal lobe. Immediately postoperatively the left-sided weakness evolved into hemiplegia. Cultures of the brain tissue revealed Listeria monocytogenes and he received 12,000,000 U penicillin daily for 2 weeks followed by 2 weeks of erythromycin (1 g/day). Stupor, disorientation and anisocoria disappeared and he was discharged to a rehabilitation center where he died of a massive gastrointestinal hemorrhage 3 months later.

10735 ANTIBODIES TO INTESTINAL MICROBES IN SERUM OF PATIENTS WITH CIRRHOSIS OF THE LIVER. (E.) Bjørneboe, M. (Bispebjerg Hosp., Copenhagen), H. Prytz and F. Ørskov. *Lancet* 1(7741):58-60, 1972.

Subjects consisted of 26 patients with hepatic cirrhosis (5 of whom had a portacaval shunt) with high levels of IgG; controls were age- and sex-matched patients with no demonstrable liver disease and normal immunoglobulin levels. Bacterial agglutinin titrations were carried out using 10 common E. coli O-group antigenic test strains (2, 4, 6, 75, 8, 9, 18, 7, 22 and 1) and 10 rare ones (30, 56, 76, 80, 87, 95, 96, 27, 52 and 61). Only O22 did not react with any of the patient sera. Against the remaining nine O groups, the 26 sera from patients with cirrhosis gave positive reactions in 59 cases; the 5 with portacaval shunts had a total of 25 positive reactions. The 26 control sera agglutinated in 20 instances. The differences between the frequencies of positive reactions in cirrhosis (2.3/patient), cirrhosis with portacaval shunt (5.0/patient) and controls (0.8/patient) were significant. The 10 rare strains were agglutinated in only 3 instances by the 52 sera, with a titer of 1:40 in each. One patient with cirrhosis and 2 controls had E. coli urinary tract infections (not typed), and no patient had symptoms of cholecystitis or cholangitis.

10736 PRIMARY BILIARY CIRRHOSIS AND THE AUSTRALIA ANTIGEN. (Sp.) Chicot, D. (CHU Pitie-Salpetriere, France), P. Gateau, L. Gazolo, C. Trepo and J. Caroli. *Arch. Fr. Mal. App. Dig.* 60(12):676-678, 1971.

In the sera of 20 patients with primary biliary cirrhosis, Australia antigen was not demonstrable by immunodiffusion, electroimmunodiffusion, complement fixation, immunoadherence, or ultracentrifugation followed by enzymatic digestion by pronase and immunoprecipitation. However, ultracentrifugation followed by electron microscopy showed the presence of 2 groups of spherical particles, with diameters of 250 Å and 500 Å, resp., corresponding closely to particles found in the sera of 10 control subjects with Australia antigen. Similar particles were not found in the sera of controls without Australia antigen or in those of controls with alcoholic cirrhosis and biliary retention. It was concluded that the particles may have represented another subclass of virus, not possessing the same antigenicity, or that electron microscopy had detected particles associated with Australia antigen before the antigen was present in sufficient quantity to be detected by immunologic techniques.

10737 EPIDEMIOLOGY OF CIRRHOSIS OF THE LIVER. (Sp.) Goti, J. L., J. D. Toledo, J. Cuezva, A. De Los Rios, A. Villanueva and A. Fernandez. *Rev. Esp. Enferm. Apar. Dig.* 35(8): 939-954, 1971.

Among 50 cirrhotic patients (34 men, 16 women) who responded to a questionnaire, 35 of 50 had consumed alcohol at a rate of more than 3 g/kg/day for periods of more than 10 yr, including 18 of 19 who reported a chronically protein-deficient diet and 10 of 22 who reported having been jaundiced at some time. A cardiopathy was reported by only 1 of 50, as contrasted to 6 of 50 matched controls. Among the controls, 10 of 50 had consumed alcohol at a rate of less than 2 g/kg/day for significant periods of time, with none reporting an inadequate diet. Jaundice or cholelithiasis were reported by 6 of 50 each. The groups appeared to be entirely comparable, in all other respects. Cirrhosis failed to develop in any animal in several groups of white rats maintained for 2 yr or more in varying states of chronic alcoholic intoxication in the presence of a well-balanced diet.

10738 INTESTINAL MICROFLORA IN PATIENTS WITH ALCOHOLIC CIRRHOSIS: UREA-SPLITTING BACTERIA AND NEOMYCIN RESISTANCE. (E.) Lal, D., S. L. Gorbach and R. Levitan (VA West Side Hosp., Chicago, Ill.). *Gastroenterology* 62(2):275-279, 1972.

Subjects consisted of 24 patients with histologic proof of Laennec's cirrhosis, 6 of whom had recurring episodes of portal systemic encephalopathy. One had a Billroth I gastrojejunostomy for peptic ulcer. None received antibiotics during the 2 weeks prior to the study. After intubation, contents of the small intestine were sampled from the stomach to the terminal ileum. Coliform organisms were cultured from the small intestine of 23; these were normally located (mid- and lower ileum) in 12, and abnormally located in 12, including stomach (3), duodenum (4) and jejunum (12). The 3 with gastric coliforms had reduced acid as evidenced by a basal gastric juice pH of 5.0 or higher and 1 of these had had the gastrojejunostomy. Small numbers of obligate anaerobes were found in the stomachs of most patients, and were generally oral-type flora, which did not grow when subcultured on 10% bile. Bile-resistant fecal-type anaerobes were found in the lower ileum of 12, and abnormally (upper and mid-jejunum) in the 3 who also had abnormally located coliforms. Urea-splitting organisms were found in 21 (small and large intestine in 18, large intestine only, in 3). The mean concentration of urea-splitters ranged from 2.5/log 10/ml in the stomach to 5.4 in the ileum and 7.0 in the stool. Urea-splitters were Klebsiella species in 19 and proteus strains in 2. The presence of encephalopathy was not related to location or concentration of urea-splitters. Three patients harbored Klebsiella strains resistant to greater than 25 μg/ml of neomycin. The intestinal microflora of 9 controls (patients with other than liver diseases) were similar to cirrhotics. Five had urea-splitters, in 4 of whom they were abnormally located in the upper small intestine. All were Klebsiella species in concentrations from 4.3 log 10/ml in the stomach to 6.3 in the stool and all were sensitive to less than 25 μg/ml of neomycin.

10739 PRIMARY BILIARY CIRRHOSIS ASSOCIATED WITH SCLERODERMA. (E.) O'Brien, S. T., W. M. Eddy and E. L. Krawitt (U. Vermont Dept. Med., Burlington). *Gastroenterology* 62(1):118-121, 1972.

A 60-yr-old housewife had primary biliary cirrhosis associated with scleroderma without the features of CRST syndrome (calcinosis, Raynaud's phenomenon, scleroderma and telangiectasia). She had no calcinosis, Raynaud's phenomenon, or sclerodactyly, and the telangiectasias present were superficial and not those seen in CRST syndrome. The lymphocytes from this patient responded normally to phytohemagglutinin stimulation and could not be induced to transform by a saline extract of her own liver tissue. This indicates a normal delayed hypersensitivity response and suggests that the cellular immune reaction to homologous liver tissue is not the etiologic mechanism in her disease.

10740 JUVENILE CIRRHOSIS OF THE LIVER AND NEPHROCALCINOSIS. (E.) Franke, G. H. (Columbia Hosp., Milwaukee, Wis.). *Wis. Med. J.* 70(9):199-201, 1971.

10741 WATER AND ELECTROLYTE METABOLISM IN THE CIRRHOSIS OF THE LIVER. THE IMPORTANCE OF THE HORMONAL FACTORS. (Rum.) Oancea, R. (Fundeni Clin. Hosp., Bucharest). *Viata Med.* 18(15):675-678, 1971.

10742 MORPHOLOGIC ASPECTS OF THE GASTRIC MUCOSA IN CIRRHOSIS OF THE LIVER. (Rum.) Dancau, G. and N. Tudose. *Timisoara Med.* 16(2):175-182, 1971.

10743 NERVOUS AND MENTAL DISORDERS IN PATIENTS WITH LIVER CIRRHOSIS AND PORTAL HYPERTENSION. (Rus.) Bogachenko, V. P. *Zh. Neuropatol. Psikhiatr. Korsakov.* 71(7):1079-1083, 1971.

10744 COMPARATIVE STUDY OF THE INCREASE OF THE BLOOD CORTISOL LEVEL INDUCED BY ANGIOTENSIN II IN NORMAL SUBJECTS AND IN CASES OF HEPATIC CIRRHOSIS. (It.) Ventura, E. (U. Modena Inst. Gen. Clin. Med. Ther. Med., Italy) and M. L. Zeneroli. *Endocrinol. Sci. Cost.* 31(4):254-261, 1969.

10745 CONGENITAL HEPATIC FIBROSIS. (Sp.) Escartin Marin, P. (Puerta De Hierro Clin., Madrid), A. Fernandez Corugedo, R. Barbadillo and C. Chantar Barrios. *Rev. Clin. Esp.* 122(1):33-40, 1971.

10746 KINETICS OF LACTIC AND PYRUVIC ACID DURING PHYSICAL EXERCISE IN MEN WITH COMPENSATED CIRRHOSIS OF THE LIVER. (Cz.) Brodanova, M. (Charles U. Sch. Gen. Med., Prague), V. Brodan, V. Kordac and Z. Marecek. *SB. Lek.* 73(9):241-248, 1971.

10747 IMMUNOGLOBULINS IN CIRRHOSIS OF THE LIVER. (Cz.) Fucikova, T. (Charles U. Sch. Med., Prague), V. Volek, J. Abrahamova and M. Jozifko. *SB. Lek.* 73(7):181-186, 1971.

10748 RENAL OSMOTIC ACTIVITY IN CIRRHOSIS OF THE LIVER. (It.) Ferrario, G. (Maggiore Hosp., Milan, Italy), U. Scaccabarozzi and D. Sardini. *Riv. Osped.* 3(4):268-278, 1971.

10749 STUDY OF THE RENAL FUNCTION IN CIRRHOTIC PATIENTS. I. DIURESIS AND GLOMERULAR FILTRATION. (Sp.) Solis Herruzo, J. A. (Cent. U. 3rd Dept. Med. Pathol., Madrid). *Rev. Clin. Esp.* 121(4):347-356, 1971.

10750 THE RELATIONSHIP BETWEEN THE NUCLEAR VOLUMES AND DNA CONTENTS OF THE HEPATOCYTE NUCLEI, IN THE NORMAL LIVER, IN THE HEPATOSPLENIC FORM OF MANSONI SCHISTOSOMIASIS, AND IN HEPATIC CIRRHOSIS. (E.) Cardoso Guimaraes, R. (Fed. U. Minas Gerais Dept. Pathol., Belo Horizonte, Brazil). *Rev. Bras. Pesq. Med. Biol.* 4(3):169-183, 1971.

10751 ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN NON ALCOHOLIC CIRRHOSIS OF LIVER. (E.) Shukla, P. K. (Banaras Hindu U., Coll. Med. Sci., Varanasi, India), J. P. Gupta and K. P. Dubey. *J. Trop. Med. Hyg.* 74(4):95-97 1971.

10752 INTRAVENOUS TRANSFUSION OF ASCITIC LIQUOR IN A CASE OF LIVER CIRRHOSIS WITH ASCITES RESISTANT TO CONSERVATIVE THERAPY. (Pol.) Szczygiel, B. (Med. Acad 3rd Surg. Clin., Warsaw, Poland), K. Drzewiecki and S. Switka. *Pol. Przegl. Chir.* 43(7):1181-1184, 1971.

10753 ACIDIFICATION OF URINE IN CIRRHOSIS OF THE LIVER. (Ger.) Schmidt, P. (Univ. 1st Med. Clin., Vienna), F. Widhalm and R. Kotzaurek. *Med. Welt* 22(38):1470-1473, 1971.

10754 DETERMINATION OF THE HALF VALUE TIME OF ^{131}I LABELED FIBRINOGEN IN PATIENTS WITH HEPATIC CIRRHOSIS AND ESOPHAGEAL VARICES. (Ger.) Leonhardt, H. (Free U. Berlin Steglitz Clin.), H. J. Bungert, H. Schmidt and C. Wolff. *Med. Welt* 22(43):1716-1717, 1971.

10755 EVALUATION OF CIRRHOTIC PATIENT FOR SURGERY. (E.) Stahl, W. M. (New York U. Sch. Med., N. Y.). *NY State J. Med.* 71(5): 570-577, 1971.

10756 INVESTIGATIONS ON CARDIOVASCULAR CHANGES AFTER VALSALVA'S MANEUVER IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Rum.) Ciplea, A. (D. Danielopolu, Inst. Physiol. Norm. Patol., Bucharest), N. R. Zamfirescu, B. Felberg and N. Balta. *Fiziol. Norm. Patol.* 17(4):323-330, 1971.

10757 BIOCHEMICAL ABNORMALITIES OF ERYTHROCYTES IN CIRRHOSIS. (Fr.) Hakim, J. (Beaujon Hosp., Clichy, France), P. Boivin, F. Afifi and R. Fauvert. *Ann. Med. Interne (Paris)* 122(4): 511-516, 1971.

See also numbers: 10153, 10685, 10688, 10715

GALLBLADDER AND BILIARY TRACT DISEASES

10758 THE GALLBLADDER IN SOME DISEASES OF THE DIGESTIVE TRACT. (E.) Stoenescu, R. (D. Danielopolu Inst. Norm. Pathol. Physiol., Bucharest). *Rev. Roum. Physiol.* 8(4):353-362, 1971.

Cholecystography was performed in 257 patients with cholecystolithiasis, 35 patients with noncalculous chronic cholecystitis and 1184 patients without organic gastrointestinal diseases (controls). In 95% of the controls the gallbladder visualized normally, and congenital morphologic abnormalities were noted in 25%. In controls, the gallbladder was normal size in 68%, enlarged in 29% and small in 3%, while motility was normal in 58%, accelerated in 3% and delayed in 39%. Those with chronic calculous cholecystitis showed poor opacification in 50%, and congenital abnormalities in 50%. In this group, size was normal in 51%, increased in 42% and decreased in 7%, while motility was normal in 31%, accelerated in 10% and delayed in 59%. Of those with noncalculous chronic cholecystitis, poor opacification was seen in 90%, and congenital abnormalities in 23%. The size of the gallbladder was normal in 68%, increased in 15% and decreased in 17%, while motility was normal in 27%, accelerated in 35% and delayed in 38%.

10759 RADIOMANOMETRY, FLOW RATES, AND CHOLANGIOGRAPHY IN THE EVALUATION OF COMMON BILE DUCT DISEASE. A STUDY OF 220 CASES. (E.) White, T. T. (U. Washington Sch. Med., Seattle), H. Waisman, D. Hopton and H. Kavile. *Am. J. Surg.* 123(1):73-79, 1972.

Bile duct studies in 200 patients showed normal findings in 131 patients, abnormal findings in 56 and equivocal findings in 11. Manometry and flow studies can be routinely used as an adjunct to cholangiography during biliary tree operations. Common bile duct pressures above 16 cm usually indicate duct or sphincter abnormalities but must be used in conjunction with cholangiography to eliminate possibilities of false negatives (3.5%) and false positives (4.5%) when used alone. Cholangiography alone had a high incidence (6%) of false negatives which could be reduced to 2.5% if the procedure was combined with pressure determination. The lowest incidence of false negatives and false positives occurred with flow measurements, which when combined with pressure or in conjunction with cholangiography give a 99.1% accuracy. Cholangiography should be performed on patients suspected of having intrahepatic stones or stones lodged in the upper parts of the biliary tree, since these stones will not cause a raised pressure or decreased flow. Pressure-flow studies are especially worthwhile in the diagnosis of organic changes in the sphincter of Oddi or stones in the distal bile duct not seen on rputine roentgenograms. Manometry was more valuable in patients undergoing a second operation.

10760 GALLSTONE ILEUS. (E.) Räf, L. (Karolinska Inst., Stockholm) and L. Spangen. *Acta Chir. Scand.* 137(7):665-675, 1971.

All 80 cases of gallstone ileus registered from 1954-67 in the hospitals in the Stockholm area (population in 1967 was 1.4 million) were analyzed. Ages ranged between 46 and 88 yr (mean age, 72 yr). Only 20 were men. The predominance of women under 72 yr was 86%. In this series 14 patients died, all but 1 postoperatively and death was not associated with higher mean age. The postoperative course of the remaining 66 was examined in 1969. Three patients had recurrence of the gallstone ileus, within 4 mo of the original surgery. Eleven patients had a cholecystectomy with an uncomplicated postoperative course. Twenty-four patients died after discharge; only 1 had serious liver disease and there was no gallbladder carcinoma. In patients dying more than 3 yr postoperatively and in 3 of the 11 patients undergoing cholecystectomy the fistula between the gallbladder and intestine had closed spontaneously. The commonest postoperative complication was wound abscess (33 patients), appearing between the eighth and fourteenth postoperative days and growing E. coli in 13 cases and enterococci in 5 cases on culture. Only 1 of 9 patients who received terramycin developed an abscess, while half of those receiving other antibiotics developed abscess. The causes of death postoperatively were circulatory failure, bronchopneumonia and uremia. The cause of death after discharge was cardiovascular disease and malignancy of the digestive tract and genitalia.

10761 THE ROLE OF THE RESIDUAL CHOLECYSTIC STUMP IN THE GENESIS OF POSTCHOLECYSTECTOMY SYNDROME. (Fr.) Frank, P., R. Wolff, R. Eisenbeth and P. Bloch. *Lyon Chir.* 67(4): 260-264, 1971.

Cholecystic stumps measuring 2 to more than 4 cm in length were responsible for the development of a postoperative syndrome in 6 of 500 patients who had undergone cholecystectomy. The symptoms were essentially identical to those which had preceded surgery. In 2 of 6, the syndrome appeared to be due to the presence of the elongated stump, without other complications, and were relieved promptly by its resection. In 3 of 6, the inflamed stump was associated with choledocholithiasis; in 1 of 6, with chronic pancreatitis and stenosis of the Sphincter of Oddi. Following removal of the calculi and resection of the stump, a choledochoduodenal anastomosis was created in all 4, followed by gradual subsidence of the postcholecystectomy syndrome.

10762 DISSOLUTION OF CHOLESTEROL GALLSTONES BY CHENODEOXYCHOLIC ACID. (E.) Danzinger, R. G. (Mayo Clin., Rochester, Minn.), A. F. Hofmann, L. J. Schoenfield and J. L. Thistle. *N. Engl. J. Med.* 286(1):1-8, 1972.

Subjects consisted of 7 women who were incapable of childbearing and who had functioning gallbladders with asymptomatic radiolucent calculi. Duodenal bile was collected after cholecystokinin stimulation. Chenodeoxycholic and cholic acid pool sizes were determined by an isotope-dilution method after i.v. injection of 2,4-^{3}H-chenodeoxycholic and 24-^{14}C-cholic acid. Total bile acid pools were calculated from the measured pools and from biliary bile acid composition. Cases are briefly reported of 4 women who ingested 0.75-4.5 g of chenodeoxycholic acid daily. A 47-yr-old woman who showed no response to an earlier diagnostic regimen with 1 g/day of cholic acid for 4 months, now showed that 3 small stones had disappeared after 6 months (initially 0.25 g TID, then 4.5 g/day by month 5). In a 54 yr-old woman taking antacids to control a diaphragmatic esophageal hernia, there was progressive decrease in size of a single large stone over a 22-month period. In a 58-yr-old patient, there was progressive decrease in size of multiple calculi from 10 to 3.5 mm over 18 months. In a 30-yr-old female there was a decrease in number and size of calculi. Biliary bile acid composition changed to become more than 90% chenodeoxycholic acid, while chenodeoxycholic acid pools (measured in the first and third patients) increased from 9.6 and 4.9 to 62.2 and 21.3 mg/kg, resp. In bile from all patients, the molar concentration of both bile acids and lecithin rose in relation to that of cholesterol with resultant increases in the ratios of total bile acid/cholesterol, lecithin/cholesterol and total bile acid plus lecithin/cholesterol. The major side effect was watery diarrhea at higher doses.

10763 APPLICATION OF THE DORMIA CATHETER TO THE EXTRACTION OF RESIDUAL BILIARY TRACT CALCULI. (E.) Mazzariello, R. (Rivadavia-Peralta Ramos Med. Ctr., Buenos Aires, Argentina). *Acta Gastroenterol. Lat. Am.* 3(2):79-84, 1971.

The author describes another of his means of extracting residual biliary calculi non-surgically. The regular covering of the ureteral Dormia catheter was replaced by very slippery Teflon, making it possible for the basket to be opened even in sharp curves. After filling the biliary passages with contrast material, a plastic sound, with a diameter sufficient to pass the Dormia catheter through it, is passed into the bile duct. The Dormia catheter is used without the Kehr tube. As soon as the sound is correctly placed (in contact with the stone), the catheter is introduced through it until its tip surpasses the position occupied by the stone. With stones in the terminal common bile duct, capture of the stone is best when the basket is opened next to the stone instead of beyond it. This method was successful in all 26 cases in which it was used (in 22 of whom stones were located in the common bile duct while in 4 they were lodged in intrahepatic branches). This procedure was painless and there were no complications. Results with other techniques in 139 patients (with 126 successful extractions) were reported previously.

10764 IDIOPATHIC RETROPERITONEAL FIBROSIS AND SCLEROSING CHOLANGITIS ASSOCIATED WITH A RETICULUM CELL SARCOMA. REPORT OF A CASE. (E.) Alpert, L. I. (Mt. Sinai Sch. Med., New York, N. Y.) and K. Jindrak. *Gastroenterology* 62(1): 111-117, 1972.

A 16-yr-old girl had severe fibrosclerosis involving the pericholedochal, periduodenal, and perureteral tissues associated with, but physically remote from, a rapidly growing anaplastic choledochal reticulum cell sarcoma. The development of both the fibrosing and neoplastic processes was followed by serial cholangiograms, biopsies, and ultimately autopsy, including ultrastructural examination of the tumor. The basic process of sclerosing cholangitis consists of segmental or diffuse transmural fibrosis of the large biliary ducts with secondary stenosis, and in this case there was intrahepatic extension to involve the hepatic hilum and main intrahepatic ducts. The reticulum cell sarcoma, demonstrating extremely rapid growth, ultimately destroyed the major portion of the common bile duct and part of the duodenal wall; the tumor showed minimal desmoplasia. Certain tumors are known to be capable of inducing fibrosis remote from their site, the endocardial fibrosis associated with some serotonin-secreting carcinoid tumors being the best recognized.

10765 RELATIONSHIP OF BILE ACID POOL SIZE TO THE FORMATION OF LITHOGENIC BILE IN FEMALE INDIANS OF THE SOUTHWEST. (E.) Vlahcevic, Z. R. (VA Hosp., Richmond, Va.), C. C. Bell, Jr., D. H. Gregory, G. Buker, P. Juttijudata and L. Swell. *Gastroenterology* 62(1):73-83, 1972.

Eleven female American Indian patients with a lithogenic bile (3 had cholesterol gallstones) had a significantly smaller bile acid pool than a group of 7 female American Indian patients with a normal bile. The total bile acid pool of 3 patients with a lithogenic bile and no gallstones was also lowered, suggesting that reduction in bile acid pool could be a factor in the development of lithogenic bile acid of subsequent gallstones. The production of primary bile acids in the female Indian averaged 350 mg/day; the primary bile acids of patients with a lithogenic bile turned over at a faster rate than in patients with a normal bile. The diminished bile acid pool in the female Indians with a lithogenic bile resulted from an inability of the liver to synthesize adequate amounts of bile acids to compensate for bile acid excretion. Slight phospholipid decreases and cholesterol increases in lithogenic bile when coupled with the reduced bile acid pool tipped the bile out of the micellar zone.

10766 THE SO-CALLED POSTCHOLECYSTECTOMY SYNDROME. (Ger.) Heinkel, K. (Stuttgart-Bad Cannstatt Med. Clin., Germany), W. Maurer and J.-M. Kimmig. *Z. Gastroenterol.* 9(5):357-366 & XV-XVI, 1971.

Among 584 patients undergoing surgery of the biliary tracts, concurrent pancreatitis was demonstrated at the time of surgery in 73 of 427 operated for cholelithiasis (17.1%), 19 of 81 operated for cholelithiasis plus choledocholithiasis (23.5%), 3 of 13 operated for recurrent choledocholithiasis (23.1%) and 19 of 63 operated for cholecystitis in the absence of calculi (30.2%). Acute or subacute pancreatitis was demonstrated at the time of surgery in 14.2% of 971 other patients undergoing upper abdominal surgery for various disorders in the absence of any preoperative indication of pancreatic involvement. It is concluded that cholecystectomy may occasionally give rise to neurinoma, granuloma or adhesions, but that the so-called postcholecystectomy syndrome is usually due to pre-existing disorder or dysfunction of organs other than the gallbladder, rather than representing sequelae of the surgical intervention.

10767 BILE-RICH DUODENAL FLUID AS AN INDICATOR OF BILIARY LIPID COMPOSITION AND ITS APPLICABILITY TO DETECTION OF LITHOGENIC BILE. (E.) Vlahcevic, Z. R. (McGuire VA Hosp., Richmond, Va.), C. C. Bell, Jr., P. Juttijudata and L. Swell. *Am. J. Dig. Dis.* 61(9):797-802, 1971.

Findings are presented to show that duodenal and gallbladder bile of the same patients with and without gallstones are similar in lipid composition. Lipid composition of duodenal and gallbladder bile in 10 patients with cholesterol gallstones was compared to 11 patients without. The lipid composition of duodenal and gallbladder bile was similar in each patient. Duodenal bile is a valid indicator of the presence of lithogenic bile as shown by a phase diagram plot of the biliary lipid composition. Analysis of the duodenal lipids showed that a distinction could be made between the presence of calcium bilirubinate and that of cholesterol gallstones. One or 2 samples of duodenal bile was sufficient to determine whether the bile was normal or abnormal. Biliary composition may be determined without resorting to surgery.

10768 BACTERIA AND DISEASE OF THE BILIARY TRACT. (E.) Scott, A. J. (U. Otago

Med. Sch., Dunedin, New Zealand). *Gut* 12(6): 487-492, 1971.

The lack of a reliable tool for the non-operative diagnosis of biliary tract infections inhibits the understanding of the role of these bacteria in disease of the biliary tract. Typhoid, cholera, and infections due to Enterobacteriaceae follow similar patterns of chronic cholecystitis in Europe and America and of recurrent pyogenic cholangitis on the Pacific coast of Asia. A septicemic phase probably occurs and pre-existing gallbladder disease is not a prerequisite for cholecystitis. The biliary tract probably does not harbor bacteria normally but bacteria may precede the development of stones often explained on the basis of "bile stasis". Acalculous cholecystitis is of unknown etiology and is often transitory. Conversely, the typhoid bacillus cannot be eradicated if prior stones exist. In carcinoma of the pancreas, gallstones are present in 10% of the patients and bacterial cholangitis in 6%. Bacterial counts greater than 10^5 are found in only 5-10% of routine cholecystectomy samples but antibiotics need to be administered only if surgical correction is not immediate. The suppurative cholangitis that occurs in Asia involves the bile ducts and is uninfluenced by cholecystectomy.

10769 INDUCED ALTERATIONS IN COMPOSITION OF BILE OF PERSONS HAVING CHOLELITHIASIS. (E.) Thistle, J. L. (Mayo Clin., Rochester, Minn.) and L. J. Schoenfield. *Gastroenterology* 61(4, Pt. 1):488-496, 1971.

The effects of administering individual bile acids, cholic acid plus clofibrate, or cholestyramine on individual bile acid proportions and on the relative concentrations of bile acids, lecithin, and cholesterol in bile were studied in 42 women with cholelithiasis. While these subjects had a mean pretreatment bile chenodeoxycholic acid level of 37%, after the administration of chenodeoxycholic acid this bile acid represented 95% of the total bile acids. After administration of cholic acid, it and deoxycholic acid comprised 91% of the total bile acids. Hyodeoxycholic acid induced a significant increase in chenodeoxycholic acid concentration. Cholic acid with clofibrate yielded results similar to those seen with cholic acid alone. Following cholestyramine administration, deoxycholic and chenodeoxycholic acids were decreased while cholic acid levels were increased. Chenodeoxycholic acid increased and clofibrate plus cholic acid decreased the ratio of bile acids plus lecithin to cholesterol, while the other agents were without effect. In no case was there any observed adverse effects due to the administered agents.

10770 A REAPPRAISAL OF SURGICAL TREATMENT FOR INTRAHEPATIC GALLSTONES. (E.) Maki, T. (Tohoku U. Sch. Med., Sendai, Japan), T. Sato and T. Matsushiro. *Ann. Surg.* 175(2): 155-165, 1972.

Of the 670 patients operated on for gallstones between 1961 and 1969 by the authors, 47 had stones in an intrahepatic location (6.9%). Forty-one had calcium bilirubinate stones, 3 had cholesterol stones and 2 were cases of rare fatty acid calcium stones. This study re-evaluated the surgical procedure in 46 of the patients. It was felt that the cholesterol stones had migrated from the gallbladder and probably resulted from biliary infection. E. coli was determined in all cases of intrahepatic gallstones. In 2 cases surgical treatment was abandoned because of associated carcinoma. The basic surgical treatment is lithotomy and in some cases transhepatic cholangiolithotomy or hepatic lobectomy. Bile stasis was eliminated and residual stones were permitted to flow away by papilloplasty or cholangiojejunostomy. The operative mortality was 15.9% and was higher in those with longer duration of symptoms or in those who required the more extensive surgical procedures. Serious consideration should be given to hepatic lobectomy and the consideration of gastric resection for duodenal exclusion is of prime importance. Late deaths in the series occurred in a cirrhotic patient with esophageal varices due to hemorrhage and in another patient due to an ascending infection. All other patients are well.

10771 HEPATIC CALCULI. (E.) Balasegaram, M. (Gen. Hosp., Kuala Lumpur, Malaysia). *Ann. Surg.* 175(2):149-154, 1972.

Hepatic calculi may be classified in accordance with the author's experience in 68 patients with calculi, as (1) originating in the extrahepatic biliary tract; (2) originating in the liver with no evidence of stones in the extrahepatic biliary tract and (3) calculi found in liver cysts. The pathogenesis depends on (a) metabolic disturbances, (b) obstruction and stasis of bile and (c) infection. The calculi that are formed in the biliary tract due to prolonged stasis (95% of cases) may, if small, temporarily migrate in and out of the liver. In this study, the incidence of biliary stones with intrahepatic stones was 10.2% and may be associated with late surgical treatment. Diagnosis was established by pre- and intra-operative cholangiography and direct examination at laparotomy. The techniques for removal of the hepatic stones are described in detail. The usual factors, believed to cause hepatic calculi arising solely in the liver, were not present in the 7 patients of this series. Calculi in most cases was in the form of gravel filling the entire tract of the left lobe in 6 patients. Six of the 7 patients were male and race was of no significance. Treatment was by hemihepactectomy and a case study is presented. Two patients had pigmented calculi contained in clear fluid cysts of the left lobe. These calculi are believed to arise from stasis of the fluid within the cyst. Hemihepatectomy was the treatment of choice.

10772 FURTHER INDICATIONS FOR INTRAHEPATIC CHOLANGIOJEJUNOSTOMY. (E.) McArthur, M. S. (UCLA Sch. Med., Los Angeles, Calif.) and W. P. Longmire, Jr. *Ann. Surg.* 175(2):190-192, 1972.

Anastomosis of an intrahepatic biliary duct to the jejunum is indicated in those patients with confirmed extensive benign obstruction of the common hepatic duct or common bile duct for whom the usual reconstructive methods have proved inadequate or as a palliative operation in malignant disease involving the extrahepatic ducts. The authors feel that in general this procedure is not indicated for the relief of jaundice due to malignant disease. Two patients with portal vein obstruction, portal hypertension, extensive hepatoduodenal venous collaterals, and benign common bile duct stricture are reported. Extrahepatic biliary obstruction was relieved in one patient and progressively improved in the other by the intrahepatic cholangiojejunostomy with partial hepatectomy. The first case involved a 48-yr-old man who sustained complete surgical transection of the hepatoduodenal ligament in 1968. End-to-end repair was made. Subsequently, common duct obstruction developed which required surgical intervention and a choledochojejunostomy was performed. Recurrent bouts of cholangitis resulted in the intrahepatic cholangiojejunostomy and the patient is well 1 yr later. The second case describes the procedure in a 15-yr-old male with Banti's syndrome.

10773 INTRAHEPATIC STONES: A CLINICAL STUDY. (E.) Wen, C.-C. and H.-C. Lee. *Ann. Surg.* 175(2):166-177, 1972.

In this study 150 patients with intrahepatic stones were analyzed. The highest incidence of stones occurred in the 21-30 yr age group (36.6%) with 86% of the patients between 21 and 50 yr old. Analysis of the number of beds available based on sex revealed that both men and women are equally affected. Most patients were undernourished and from a lower socio-economic class. The patients presented with chills and fever, concomitant right upper quadrant abdominal pain and in 1 or 2 days jaundice appeared. Severe toxic symptoms were noted and attacks varied from once a week to once in more than a year. The stones are translucent but transhepatic cholangiography may be of some help. Operative findings and methods of removing the stones, which were mostly composed of bile pigment are discussed in detail. The surgical procedures with the highest degree of success were side-to-side choledochoduodenostomy because of recurrent stones, hemihepatectomy, and most recently transduodenal sphincteroplasty. Mortality was 4.6% due mostly to hepatic failure with infection as a contributing factor. On culture of the bile from 59 cases, 29 cases grew E. coli. No association between primary carcinoma and the occurrence of hepatic stones was found. Surgical cure rate was only 13.3% and it is hoped that the cause, possibly nutritional, is discovered.

10774 ANESTHESIA AND RESUSCITATION FOR SURGERY OF THE BILIARY TRACT IN EARLY INFANCY. (Fr.) Gaudiche, O. (16 Rue du Docteur Roux, Paris) and A. M. Dubousset. *Cah. Anesthesiol.* 19(4): 479-484, 1971.

10775 BILIARY PERITONITIS DUE TO PERFORATED ACUTE CHOLECYSTITIS. (Sp.) Gatta, F. D. G. A. *Bol. Soc. Argent. Cir.* 32(1):13-18, 1971.

10776 THE CLINICAL COURSE AND DIAGNOSIS OF CHOLECYSTOPANCREATITIS. (Rus.) Podielets, V. F. *Zdravookhr. Beloruss.* 17(7): 6-8, 1971.

10777 OBSTRUCTIVE JAUNDICE DUE TO HEMATOBILIA. (Ger.) Quast, M. (St. Georg Reg. Hosp., Leipzig, Germany) and D. Clauss. *Zentralbl. Chir.* 96(18):618-622, 1971.

10778 HYPERPLASTIC CHOLECYSTOSIS. WITH REFERENCE TO 17 CASES. (Sp.) Acerbi Cremades, N. (Natl. U. Cordoba, Argentina) and C. Serra. *Prensa Med. Argent.* 58(15):770-776, 1971.

10779 ANATOMICAL VARIETIES OF BILIARY TRACTS SITUATED IN THE REGION OF THE PORTA HEPATIS. (Pol.) Walkiewicz, E. (Med. Acad Ist Surg. Clin., Wroclaw, Poland). *Pol. Przegl. Chir.* 43(7):1117-1123, 1971.

10780 LATE RESULTS OF SURGICAL TREATMENT OF CHOLECYSTITIS. (Rus.) Bognitskaia, T. N. and P. M. Lukichev. *Khirurgiia (Mosk.)* 47(7):76-80, 1971.

10781 BILIARY TRACT SURGERY FOR BENIGN DISEASE. (Por.) Ximenes Neto, M. (U. Brasilia Sch. Health Sci., Brazil). *Rev. Assoc. Med. Minas Gerais* 22(1):21-29, 1971.

10782 INTESTINAL MALABSORPTION IN HEPATOBILIARY DISEASES. (Rus.) Frolkis, A. V. (U. Petrozavodsk, USSR) and T. I. Belenkaia. *Klin. Med. (Mosk.)* 49(8):92-96, 1971.

10783 INFLUENCE OF CHOLANGITIS ON THE SECRETION OF STEROIDS BY THE STOMACH AND

KIDNEYS. (Rus.) Popov, I. D. (Med. Inst., Kiev, USSR). *Klin. Med. (Mosk.)* 49(8):77-81, 1971.

10784 PLASTIC REPAIR OF VESICODUCTAL FISTULA USING THE WALL OF THE GALLBLADDER AND TRANSSECTING THE SPHINCTER OF ODDI. (Pol.) Formejster, I. (Dist. Hosp., Wagrowiec, Poland). *Wiad. Lek.* 24(17):1663-1664, 1971.

10785 A STUDY OF TREATMENT OF PATIENTS WITH ACUTE CHOLECYSTITIS. (Rus.) Kovalev, M. M. *Vestn. Khir.* 106(5):17-21, 1971.

10786 CARCINOMA OF THE GALLBLADDER. (E.) Holmes, S. L. (Stanford U. Sch. Med., Calif.) and J. B. D. Mark. *Surg. Gynecol. Obstet.* 133(4):561-564, 1971.

10787 STENOSIS OF THE COMMON BILE DUCT AFTER GASTRECTOMY. (Fr.) Hureau, J. (Vaugirard Hosp., Paris) and P. Vayre. *Sem. Hop. Paris* 47(23):1526-1529, 1971.

10788 CLINICAL SYMPTOMS AND MORPHOLOGIC CHANGES IN THE GALLBLADDER IN THE COURSE OF CHOLELITHIASIS. (Pol.) Gryglicki, J. (Med. Acad. 3rd Surg. Clin., Bytom, Poland). *Pol. Przegl. Chir.* 43(7):1081-1089, 1971.

10789 REINTERVENTIONS ON THE BILIARY TRACT. (Pol.) Glinski, M. (Med. Acad Ist Surg. Clin., Zabrze, Poland), W. Grzywna and M. Pardela. *Pol. Przegl. Chir.* 43(1):7-10, 1971.

10790 THE TACTICS OF ROENTGENOLOGIC INVESTIGATION IN CALCULOUS CHOLECYSTITIS. (Rus.) Sharov, B. K. (Med. Inst., Chelyabinsk, USSR) and I. D. Rostovtseva. *Khirurgiia (Mosk.)* 47(10):63-67, 1971.

10791 TELEVISED RADIOCHOLANGIOMANOMETRY. (Sp.) Chikiar, A. (Pirovano Hosp., Buenos Aires, Argentina), J. A. Resio and M. Sapochnik. *Prensa Med. Argent.* 58(14):734-737, 1971.

10792 DECOMPRESSION OPERATIONS ON THE DUODENUM AND BILE DUCTS (CHOLECYSTOJEJUNOSTOMY, CHOLEDOCHOJEJUNOSTOMY, DUODENOJEJUNOSTOMY). (Rus.) Smirnov, E. V. *Vestn. Khir.* 107(8):41-45, 1971.

10793 RECENT EXPERIENCES WITH GALLSTONE ILEUS. (E.) Vejlsted, H. (Princeton Hosp., N. J.), J. B. Hastings, W. Haynes and J. Chandler. *J. Med. Soc. NJ* 68(8):659-660, 1971.

10794 PRIMARY SCLEROSING CHOLANGITIS. (E.) Tinckler, L. (U. Singapore Dept. Surg.). *Postgrad. Med. J.* 47(552):666-670, 1971.

10795 THE CONCLUSIVENESS OF ROENTGENOLOGIC ASSESSMENT OF THE GALLBLADDER REFLEX. COMPARATIVE PLANIMETRIC INVESTIGATIONS. (Ger.) Koenig, H. (Martin Luther U. 2nd Med. Clin., Halle, Germany). *Z. Gesamte Inn. Med.* 26(18):588-591, 1971.

10796 MALIGNANT NEURILEMMOMA OF THE PAPILLA OF VATER. (Pol.) Krajka, K. (Med. Acad. Inst. Surg., Gdansk, Poland) and J. Dybicki. *Pol. Przegl. Chir.* 43(7):1177-1179, 1971.

10797 ACUTE CHOLECYSTITIS FOLLOWING UNRELATED SURGERY. (E.) Callaghan, J. (Winneshiek County Mem. Hosp., Decorah, Iowa). *J. Ir. Med. Assoc.* 64(418):424-427, 1971.

10798 SIMULATED DUPLICATION OF THE GALLBLADDER. (Ger.) Hering, K. (Knappschafts Hosp., Recklinghausen, Germany) and G. Billenkamp. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):542-543, 1971.

10799 ROENTGENOLOGIC AND GENERAL ASPECTS OF EMPHYSEMATOUS CHOLECYSTITIS. (Ger.) Keller, H. L. (Tech. U. Isar Clin., Munich, Germany), M. Ferstl and N. Rupp. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):475-482, 1971.

10800 ADENOMYOMATOSIS OF THE GALLBLADDER. (Ger.) Frommhold, W. (U. Tubingen Inst. Radiol. Med., Germany) and K. Lagemann. *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):464-475, 1971.

10801 CARCINOID TUMOURS OF THE AMPULLA OF VATER. (Fr.) Moreaux, J., E. Martin and P. Bloch. *Chirurgie* 97(7):473-479, 1971.

10802 THE STRATIFICATION PHENOMENON OF THE GALLBLADDER AND THE ROENTGENOLOGIC DIAGNOSIS OF CHOLECYSTITIS. COMMENT UPON THE PAPER BY PREUSS H.J.: 'STRATIFICATION PHENOMENA OF THE GALLBLADDER IN INTRAVENOUS CHOLANGIOGRAPHY', EXPRESSION OF RESORPTIVE MUCOSAL FUNCTION? (Ger.) Lindenbraten, L. D. (I.M. Setschenov Ist Med. Inst., Moscow). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 115(4):457-464, 1971.

10803 ANALYSIS OF 25 CHILDREN ADMITTED FOR BILE DUCT ATRESIA IN THE COURSE OF 17 YEARS. (Cz.) Navratil, M. (Palacky U. Sch. Med., Olomouc, Czechoslovakia). *Cesk. Pediatr.* 26(6):277-279, 1971.

See also numbers: 10118, 10134, 10145, 10152, 10211, 10549, 10676, 10716

10804 DIARRHOEA: MECHANISMS AND TREATMENT. (E.) Low-Beer, T. S. (Bristol Roy. Infirm., England) and A. E. Read. *Gut* 12(12): 1021-1036, 1971.

Two main mechanisms have been held responsible for acute diarrhea: excessive secretion of water and electrolytes into the intestine stimulated by bacterial toxins (e.g. in cholera), and mucosal injury by bacteria resulting in inflammation, exudation of serum and blood, and impaired absorptive function (e.g. in bacillary dysentery). Humoral agents in diarrhea are discussed in relation to Zollinger-Ellison syndrome, carcinoid syndrome, medullary carcinomas of the thyroid and cyclic AMP. Diarrhea in the stagnant loop syndrome, osmotic diarrhea associated with disaccharidase deficiency, the influence of small intestine disease on colonic absorption, and diarrhea in disorders of intestinal motility, chronic colonic disease and in celiac disease are reviewed. Diarrhea can usefully be considered as a disturbance in the balance between the mechanisms controlling secretion and absorption of water resulting in an excess loss of water in the feces.

10805 MESENTERIC VENOUS THROMBOSIS AND SMALL-BOWEL INFARCTION FOLLOWING INFUSION OF VASOPRESSIN INTO THE SUPERIOR MESENTERIC ARTERY. (E.) Renert, W. A. (Columbia-Presbyterian Med. Ctr., New York, N. Y.), K. F. Button, S. L. Fuld and W. J. Casarella. *Radiology* 102(2):299-302, 1972.

A 60-yr-old male presented in 1963 with a postbulbar ulcer, with a recurrence and stricture in 1965 for which he underwent hemigastrectomy, vagotomy and Billroth II anastomosis. He did well until 1968 when he was admitted for evaluation of hepatosplenomegaly. A gastrointestinal series revealed a normal postoperative stomach with no evidence of varices. In 1969 he was admitted with melena and ascites and was considered to have borderline hepatic encephalopathy for which he was transfused and discharged. He was readmitted in late 1970 with increasing ascites, deepening jaundice and asterixis. He appeared to improve on a low-protein, high-carbohydrate, high-fat diet with p.o. neomycin, but suddenly developed bleeding varices with no response to multiple transfusions. A Sengstaken-Blakemore tube was passed and he received 20 U vasopressin in 50 ml of 5% dextrose and water i.v. over a period of 30 min and this was repeated 3 times at 2-hr intervals, with no real cessation of bleeding. Sixteen hr after the last infusion, he underwent emergency percutaneous superior mesenteric artery catheterization through the right femoral artery. This revealed that the superior mesenteric and portal veins were patent, and 0.2 U/ml/min of vasopressin was infused directly into the superior mesenteric artery by a constant infusion pump. This was followed by a cessation of bleeding and return of blood pressure to normal. Fifteen hr later his urinary output fell markedly and he was noted to be quite acidotic so the infusion was stopped. He died 11 hr later. Autopsy revealed thrombotic occlusion of several small veins in the mesentery adjacent to the jejunum at a point 100 cm from the Ligament of Treitz. No such occlusions were seen in the mesenteric arterial tree.

10806 SELECTIVE ARTERIAL EMBOLIZATION. A NEW METHOD FOR CONTROL OF ACUTE GASTROINTESTINAL BLEEDING. (E.) Rösch, J. (U. Oregon Med. Sch., Portland), C. T. Dotter and M. J. Brown. *Radiology* 102(2):303-306, 1972.

A 43-yr-old woman with diabetes and chronic alcoholism was hospitalized because of gastrointestinal bleeding. She was treated medically for ulcer disease but failed follow-up, being readmitted 9 months later with abdominal distention, jaundice and melena, followed by active bleeding, hematemesis and moderate shock. She was treated with transfusions and gastric lavage with iced saline. Emergency percutaneous femoral arteriography revealed gross arterial bleeding from branches of the right gastroepiploic artery into the prepyloric part of the stomach, as well as an intrahepatic pattern of cirrhosis and portal hypertension with mesenteric and esophageal varices. After a 40-min infusion of epinephrine into the common hepatic artery at a rate of 20 μg/min there was considerable vascular constriction with no evidence of continuing extravasation of contrast medium. She received another 20-min infusion followed by disappearance of clinical signs of active bleeding. Bleeding resumed shortly and required transfusion with 3 U in 4 hr. The femoral catheter was removed and another was inserted through the left axillary artery into the gastroepiploic artery. Following a 20-min infusion with epinephrine (6 μg/min), a 2-ml autogenous blood clot was injected through the catheter; this clot required at least 45 min to form because of her severe coagulation defect of hepatic etiology. The catheter was withdrawn 2 cm and followed by another 20-min infusion. With no recurrence, follow-up arteriography 14 hr later showed a 5-cm segmental occlusion of the gastroepiploic artery at the site in question. In the absence of further bleeding she developed hepatorenal syndrome and died 13 days after admission.

10807 FECAL EXCRETION OF BILE ACIDS: A NEW TECHNIQUE FOR STUDYING BILE ACID KINETICS IN PATIENTS WITH ILEAL RESECTION. (E.) Woodbury, J. F. (U. Colorado Sch. Med., Denver) and F. Kern, Jr. *J. Clin. Invest.* 50(12): 2531-2540, 1971.

The 11 subjects with diarrhea were divided into 2 groups: the first consisted of 5 with less than 100 cm of ileum resected or involved with disease (regional enteritis) and 1 with pancreatic insufficiency without intestinal disease; 5 in whom more than 100 cm of ileum had been resected or was involved with disease. After an overnight fast, each subject was given 10 μCi cholic acid-^{14}C i.v. early in the morning and 3 hr later, with breakfast, each took 2 μCi $^{51}\mathrm{CrCl}_3$ in water p.o. Individual stools were collected during the next 36-96 hr. No dietary restrictions were imposed at any time. The excretion rate of ^{51}Cr was similar in both groups, but that of cholic acid-^{14}C was more rapid in those with the greater degree of ileal unvolvement. The cholic acid absorption coefficient (calculated as the difference between the excretion rates of ^{51}Cr and ^{14}C) was normal in the single patient with pancreatic insufficiency, moderately decreased in those with less than 100 cm of ileal involvement and very decreased or even zero in those with more extensive involvement; an inverse linear relationship was described. The daily fecal excretion of bile acids was 1-2 times normal in those with less involvement and 2-8 times normal in the others. In all patients with ileal disease, there was a direct correlation between fecal bile acid, fecal mass and fecal water.

10808 CHANGES IN BODY COMPOSITION AFTER JEJUNOILEAL BYPASS IN MORBIDLY OBESE PATIENTS. (E.) Brill, A. B. (Vanderbilt U. Med. Ctr., Nashville, Tenn.), H. H. Sandstead, R. Price, R. E. Johnston, D. H. Law, IV and H. W. Scott, Jr. *Am. J. Surg.* 123(1):49-56, 1972.

Studies of body weight, lean body mass, and total body water were conducted in 25 patients with massive obesity for up to 36 mo. Patients underwent either Payne-De Wind or modified Payne-De Wind jejunoileal bypass; the latter procedure gave more satisfactory results. Patients with good responses after either procedure lost 20-40% of their body weight in 12 months. Fat loss proceeded faster than loss of lean body mass, the operation achieving its goal of weight reduction with relative sparing of muscle mass. Patients with massive obesity had more water than expected per kg of lean body mass; this increased hydration was striking and amounted to a 21.5% increase in body water. Postoperatively, losses of potentially large amounts of water and electrolytes, as well as nutrients, in diarrhea must be noted carefully and replaced promptly. Insensible water losses were high, amounting to 2.4 and 2.9 l/day in 2 patients without diarrhea. After the first month or 2, if fat intake is kept below 20-30 g/day, patients can have 1-4 formed stools per day. When diarrhea persists or is transiently severe, replacement of electrolyte, vitamin and water deficits should be accomplished.

10809 GASTRIN AND G-CELLS IN THE ANTRAL MUCOSA OF PATIENTS WITH PERNICIOUS ANAEMIA, ACROMEGALY AND HYPERPARATHYROIDISM AND IN A ZOLLINGER-ELLISON TUMOUR OF THE PANCREAS. (E.) Creutzfeldt, W. (U. Gottingen Dept. Med., Germany), R. Arnold, C. Creutzfeldt, G. Feurle and H. Ketterer. *Eur. J. Clin. Invest.* 1(6): 461-479, 1971.

In 6 patients with pernicious anemia, achlorhydria, and elevated serum gastrin levels, the antral mucosal gastrin content, estimated with an immunologic method, was more than 20 times higher than normal controls, and the G-cells, localized using peroxidase-labeled antibodies, were more numerous. Increased secretory activity as well as hyperplasia of the G-cells was seen. Gastrin release occurred by intracellular dissolution of the granule content with the membranous sacs. Zollinger-Ellison tumor contained gastrin and gave a positive immunohistologic reaction for this hormone. G-cell hyperplasia was noted in 6 cases of acromegaly, 4 of which also had an increased antral gastrin content. The pituitary, especially growth hormone, may have a trophic function on the G cells. Three hyperparathyroidism patients showed G-cell hyperplasia and increased gastrin content suggesting a trophic function of serum calcium level on the G-cells.

10810 SYSTEMIC SCLERODERMA AND MASSIVE INFARCTION OF INTESTINE AND LIVER. (E.) MacMahon, H. E. (Tufts U. Sch. Med., Boston). *Surg. Gynecol. Obstet.* 134(1):10-14, 1972.

The primary symptoms of a 77-yr-old female were recurrent midepigastric cramplike pains over a 6-month period. These pains increased in severity and frequency and were accompanied by anorexia and weight loss. The patient developed an acute abdomen, and died in a state of shock 3 days later. At autopsy, she was found to have massive infarction of the intestine and liver and also scleroderma involving the small vessels, particularly the small arteries of the splanchnic area. Vasospasm was probably the most important single factor responsible for the infarction necrosis in this patient, underlying systemic sclerosis being the precipitating factor. That mechanism would provide a probable basis for the recurrent cramplike abdominal pains.

10811 SYSTEMIC EFFECTS OF PARENTERAL CHOLERA ENTEROTOXIN IN DOGS. (E.) Pierce, N. F. (Baltimore City Hosps., Md.), J. R. Graybill, M. M. Kaplan and D. L. Bouwman. *J. Lab. Clin. Med.* 79(1):145-156, 1972.

The cause of death, seen frequently 2-10 days after single doses of 100 μg of purified cholera enterotoxin were administered was unknown. Diarrhea was not observed but several biochemical abnormalities occurred including: hyponatremia, hyperglycemia, and elevated SGOT and alkaline phosphatase levels. Serum glucose was elevated within 6 hr and remained increased for at least 5 days in fasting dogs. As little as 10 μg of cholera enterotoxin caused an elevation of serum alkaline phosphatase within 24-48 days; the increase was seen after 5 days. The elevated levels were clearly of hepatic origin and may be due to induction by cholera enterotoxin mediated by hepatic adenyl cyclase. Hyponatremia and increased SGOT levels were also of several day's duration. A formalinized cholera toxoid produced none of the above effects.

10812 IMMUNOLOGICAL RESPONSES IN SJØGREN'S SYNDROME AND RHEUMATOID ARTHRITIS. (E.) Whaley, K. (Western Infirm., Glasgow, Scotland), A. C. A. Glen, R. N. M. MacSween, S. Deodhar, W. C. Dick, G. Nuki, J. Williamson and W. W. Buchanan. *Clin. Exp. Immunol.* 9(6):721-732, 1971.

Reduced numbers of patients sensitized to 2-4 dinitrochlorobenzene were observed in sero-positive rheumatoid arthritics (58%) and rheumatoid arthritics with Sjogren's syndrome (50%). Normal responses were seen in patients with sicca syndrome and sero-negative rheumatoid arthritis. Sero-positive rheumatoid arthritics had a lower serum albumin. Mantoux responses were seen in patients with rheumatoid arthritis and Sjogren's syndrome at the 1:1000 dilution and patients with sicca syndrome at 1:100 dilution. Lymphocyte RNA:DNA ratios were increased in those groups of patients responding poorly to 2-4 dinitrochlorobenzene. A correlation was found between mean diameter of lymphocytes in the peripheral blood and the RNA:DNA ratios, suggesting that patients with elevated ratios have an absolute, or relative increase in the number of large lymphocytes circulating. Failure to respond to 2-4 dinitrochlorobenzene may be due to a deficiency of uncommitted small lymphocytes.

10813 GASTROINTESTINAL CANCER IN IRAN. (E.) Haghighi, P. (Pahlavi U. Dept. Pathol., Shiraz, Iran) and K. Nasr. *J. Chronic Dis.* 24(10):625-633, 1971.

The minimal incidence, 483 cases over a 6-yr period, of gastrointestinal cancers in Southern Iran was compared to the true incidence in Connecticut. The incidence of esophageal cancer and cancers of the small intestine was higher in Fars, Iran for both males and females up to age 45; the predominant types were squamous cell carcinoma and lymphoma, resp. Small intestinal lymphomas appear to be a distinct entity found in and apparently only reported from the Middle East. Except for 1 case in the 0-14 age group large intestinal cancers, predominantly adenocarcinoma, were not more frequent in Fars. Rectal cancers are more frequent in Fars in only 2 age brackets under 35. In men up to age 65 and in women in the 25-45 age bracket, primary liver cancers were definitely more frequent. This may be due to the high incidence of primary hepatocellular tumor seen in association with postnecrotic cirrhosis. Gallbladder and biliary tract tumors, but not pancreatic cancers, were more frequent in Fars. Gastric cancer is the most frequent gastrointestinal tract malignant neoplasm in Fars: two-thirds of gastrointestinal tumors are in the upper segments.

10814 BIOPSY DIAGNOSIS OF AMYLOIDOSIS IN RHEUMATOID ARTHRITIS. MALABSORPTION CAUSED BY INTESTINAL AMYLOID DEPOSITS. (E.) Pettersson, T. (Univ. Cent. Hosp., Helsinki) and O. Wegelius. *Gastroenterology* 62(1):22-27, 1972.

Biopsy specimens were taken from the gingiva, small intestine, rectum and kidney of 15 patients with severe rheumatoid arthritis and known amyloidosis, and the rates of detection of amyloid were compared in the different locations. Amyloid was clearly demonstrated in 4 of 11 gingival specimens, and 10 of 15 rectal biopsies. Intestinal biopsy revealed amyloid in all 12 patients studied, and renal biopsy was positive in all 8 patients investigated. Histologic examination of the jejunal mucosa revealed villi of normal appearance in all the cases studied. Amyloid deposits were located perivascularly in the lamina propria and submucosa in 10 cases, but was subepithelial in 2. Twelve patients had impaired renal function and in 7 cases intestinal malabsorption, especially of lactose was revealed. The data suggest that small intestinal biopsy is valuable in the diagnosis of amyloidosis.

10815 POSTOPERATIVE SALIVARY AMYLASE CHANGES IN CHILDREN. (E.) Groza, P. (D. Danielopolu Inst. Norm. Pathol. Physiol., Bucharest), V. Zamfir and D. Lungu. *Rev. Roum. Physiol.* 8(4):307-312, 1971.

Subjects consisted of 24 children (6-15 yr) who were subjected to average surgical stresses. Total and parotid saliva outputs were stimulated by the method of Holmes (10) and by lingual application of lemon juice (14) and saliva samples were collected before surgery and on postoperative days 1, 2 and 4. The Holmes method consists of oral breathing assured by nose clamping and lemon juice applied on the tongue. The salivary amylase concentration was assayed by the method of Wolgemuth. Preoperatively, total salivary output in response to Holmes stimulation was 60.6% that seen in response to lemon juice and the parotid response to lemon juice was 65.6% of total response to lemon juice. Total Holmes-stimulated saliva increased directly with age, while total and parotid saliva in response to lemon juice decreased with age. Postoperatively, the total quantity of saliva decreased on day 1 to 50% of the control value and returned to normal by day 4; parotid output was not well measured. No relations to age were seen postoperatively. Preoperatively, the amylase concentration of lemon-stimulated total saliva was 6.8 times that of Holmes-stimulated total saliva, and that of lemon-stimulated parotid saliva was

10.1 times as great; the values for amylase output were 10.0 and 10.6 times those seen with Holmes stimulation. On postoperative day 1 there were significant elevations in amylase concentration (76, 82 and 65%, resp), which did not peak until day 2 in both cases of total saliva. By day 4, values from total saliva had returned to normal while those with parotid saliva were significantly lower. Total saliva amylase did not rise significantly until day 2 and returned to normal by day 4.

10816 GASTROINTESTINAL KAPOSI'S SARCOMA: ROENTGEN MANIFESTATIONS. (E.) Calenoff, L. (Passavant Mem. Hosp., Chicago, Ill.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 114(3):525-528, 1972.

The literature is reviewed (8 references) and a single case is presented of a 64-yr-old white man who complained of cramping epigastric pain which was relieved by eating. Biopsy of a skin lesion 6 months earlier yielded a diagnosis of Kaposi's sarcoma. On examination he was thin and pale, his stool was guaiac positive and his hematocrit was 29%. An upper gastrointestinal study showed a marked coarsening of the entire gastric mucosa, and, with compression, multiple large submucosal mass-like defects were seen. Gastroscopy showed large and irregular mucosal folds which did not flatten with air insufflation, but there were no nodules or masses on the mucosa. A large irregular ulcer was seen on the lesser curvature of the antrum and a second small linear ulceration on a large fold on the greater curvature. After a dosage of 2500 rads to the stomach over a period of 4 weeks, the ulcer symptoms and gastrointestinal bleeding abated. Severe abdominal cramps 1 month after termination of radiotherapy led to readmission and gastroscopy at this time showed an entirely normal gastric mucosa. The stomach was also normal on gastrointestinal examination, but a 25-cm segment of distal jejunum was narrowed and showed thumb-printing and contained a 3-cm ulceration. The adjacent jejunal loops were edematous and a few small nodules were seen. A second course of radiotherapy (as above) led to marked radiographic improvement. Three weeks after termination of radiotherapy he was admitted with severe abdominal pain and free air in the peritoneum on X-ray. At surgery there was a small perforation in a necrotic segment of jejunum, which was resected. There was evidence of peritonitis but no evidence of visceral Kaposi's sarcoma. He died 24 hr later of generalized peritonitis. At autopsy, the right adrenal gland was the only viscera with evidence of sarcoma.

10817 GASTROINTESTINAL BLEEDING IN THE RENAL TRANSPLANT PATIENT. (E.) Lewicki, A. M. (Harvard Med. Sch., Boston, Mass.), S. Saito and J. P. Merrill. *Radiology* 102(3): 533-537, 1972.

Upper gastrointestinal studies were performed pre- (controls) or postoperatively in 51 of 235 patients who received renal transplants. In 33 of the 51, the esophagus, stomach and duodenum appeared radiographically normal. Another 15 had gastroduodenal ulcers while 1 each had esophageal moniliasis, intramural hematoma of the esophagus and gastric neoplasm. Most of those with ulcers were in the second to fourth decades and 8 of the 15 were males. Only 1 had a history of ulcer disease before entering the transplant program. Gastrointestinal bleeding occurred in 12 of 15 post-transplant patients. Ulcerations even when severe enough to be a source of bleeding, tended to be otherwise asymptomatic in most post-transplant patients. However, nausea and vomiting of magnitude sufficient to be disabling, occurred in more than half of the pre-transplantation dialysis patients. There was an increase of ulcers immediately before and after surgery, while immunosuppressive therapy was usually only started at the time of surgery. A similar pattern of occult blood in stools was seen. Gastrointestinal hemorrhage was a major cause of death in 12 of the 62 renal transplant patients whose autopsy records were reviewed; in 7 of these there was a generalized bleeding diathesis at the time of death. In the post-transplant group, 6 ulcers were seen in the stomach, 7 in the duodenum (2 patients had ulcers in both sites). Among the pre-transplant patients on dialysis, gastric ulcers were seen in 2, duodenal in 5. Ulcers were multiple in both locations and tended to be small, (only 3 were greater than 5-20 mm in diameter). Widened rugae and enlarged duodenal mucosal folds were common. In the duodenum a mucosal pattern resembling that associated with hypertrophy of Brunner's glands was seen in 80% of pre-operative controls and 60% of post-transplant patients.

10818 GASTROINTESTINAL BLEEDING CAUSED BY OBSTRUCTION OF VISCERAL ARTERIES. (Ger.) Fritsch, A. (U. Vienna 1st Surg. Clin.), G. Lechner and W. Zaunbauer. *Z. Gastroenterol.* 9(6):442-446, 1971.

Case reports for 3 patients with intermittent melena caused by obstruction of the celiac artery and, in 2 cases, stenosis of the mesenteric artery illustrate how angiography can be used to diagnose rare causes of gastrointestinal bleeding. A 50-yr-old man who had been subjected to laparotomy 4 times underwent pyloroplasty and vagotomy for a suspected peptic ulcer before the cause of the bleeding was identified. Reconstructive vascular surgery consisted of placing a Y-prosthesis between the aorta and the craniad mesenteric artery on 1 side and the common hepatic artery on the other. The patient was asymptomatic 24 months after surgery. A 40-yr-old man who had undergone a Billroth II operation for bleeding is asymptomatic 12 months after construction of a lieno-aortic bypass. An attempt to construct a lieno-aortic bypass in a third patient failed for technical reasons.

10819 SKIN AND GASTROINTESTINAL TRACT. (Ger.) Nurnberger, F. (Rudolf Virchow Hosp., Berlin). *Z. Haut. Geschlechtskr.* 46(19):595-601, 1971.

10820 THE CORRELATION OF UROLOGIC AND GASTROINTESTINAL SYMPTOMATOLOGY. (Ger.) Mattelaer, J. J. (St. Jozef Clin., Brugge, Belgium) and R. Maenhoudt. *Z. Urol. Nephrol.* 64(6):415-422, 1971.

10821 CLINICAL AND EPIDEMIOLOGIC FEATURES OF DYSENTERY IN HIGH NORTHERN LATITUDES. (Rus.) Zhurkin, A. T. *Sov. Med.* 34(8):137-138, 1971.

10822 A CASE OF PRIMARY AMYLOIDOSIS WITH PORTAL HYPERTENSION AND ERYTHROCYTOSIS. (Rus.) Guglin, E. R. and O. P. Denisova. *Probl. Gematol. Pereliv. Krovi* 16(7):52-53, 1971.

10823 THE TOPOGRAPHY AND DYNAMICS OF THE NORMAL NECROTIC AREAS IN THE HUMAN EMBRYO MEASURING 11-30 MM. THE NECROTIC AREAS OF THE ANLAGEN OF THE DIGESTIVE, PULMONARY, CARDIAC AND UROGENITAL APPARATUSES. HISTOLOGIC AND HISTOCHEMICAL STUDY. (Fr.) Ilies, A. (Med. Res. Ctr., Timisoara, Rumania). *Rev. Roum. Embryol. Cytol.* [*Embryol.*] 8(1):55-66, 1971.

10824 ACUTE GASTROINTESTINAL PROBLEMS IN THE INTENSIVE CARE UNIT. (E.) Markowitz, A. M. (Columbia U. Coll. Physicians Surg., New York, N. Y.). *Med. Clin. North Am.* 55(5):1277-1284, 1971.

10825 GASTROINTESTINAL COMPLICATIONS AFTER RENAL TRANSPLANTATION. (E.) Hadjiyannakis, E. J. (U. Cambridge Dept. Surg., England), D. B. Evans, W. A. B. Smellie and R. Y. Calne. *Lancet* 2(7728):781-785, 1971.

10826 MUCOSAL CYSTS IN THE GASTROINTESTINAL TRACT OF BEAGLE DOGS. (E.) Feron, V. J. (TNO Cent. Inst. Nutrit. Food Res. Zeist, Netherlands) and J. W. M. A. Mullink. *Lab. Anim.* 5(2):193-201, 1971.

10827 PATHOGENESIS OF BACTERIAL DIARRHEAS. (E.) Grady, G. F. (Massachusetts Dept. Public Health, Boston) and G. T. Keusch. *N. Engl. J. Med.* 285(15):831-841, 1971.

10828 FATAL GASTROINTESTINAL BLEEDING SEVEN YEARS AFTER AORTOFEMORAL GRAFT. (E.) Buckley, M. J., Jr. (Massachusetts Gen. Hosp., Boston) and B. Castleman. *N. Engl. J. Med.* 285(13):739-745, 1971.

10829 TUBERCULOUS PERITONITIS. (E.) Remigio, P. A. (Catholic Med. Ctr., Brooklyn, N. Y.) and H. T. Grinvalsky. *NY State J. Med.* 71(14):1757-1761, 1971.

10830 DIGESTIVE TRACT HEMORRHAGES CAUSED BY DRUGS. (Fr.) Leuridan, B. *J. Sci. Med. Lille* 89(11):437-440, 1971.

10831 ASSESSMENT OF THERAPEUTIC MEASURES USED IN THE TREATMENT OF CHRONIC DYSENTERY ACCOMPANIED BY PROLONGED BACTERIA CARRIER STATE. (Rus.) Speranskii, N. P. *Pediatriia (Mosk.)* 50(11):21-25, 1971.

10832 CONSTRUCTION AND USES OF A 'DATA BASE', OF CLINICAL INFORMATION CONCERNING 600 PATIENTS WITH ACUTE ABDOMINAL PAIN. (E.) De Dombal, F. T. (Gen. Infirm., Leeds, England), J. C. Horrocks, J. R. Staniland and P. J. Guillon. *Proc. R. Soc. Med.* 64(9):978, 1971.

10833 GASTROINTESTINAL TRACT SPASMOPHILIA AND TREATMENT WITH SODIUM BICARBONATE. (Fr.) Anonymous. (Hydrol. Res. Ctr., Vichy, France). *Presse Therm. Climat.* 108(2):54-58, 1971.

10834 PRESENCE OF A1 FETOPROTEIN IN THE SERUM OF 4 CASES OF PRIMARY ALIMENTARY TRACT CARCINOMA OTHER THAN HEPATOMA. (Fr.) Bernades, P. (Bichat Hosp., Paris), M. Smadja and B. Rueff. *Presse Med.* 79(36):1585-1587, 1971.

10835 CONVENIENCE OF ENDOSCOPY IN THE DIAGNOSIS OF HEMORRHAGE FROM THE UPPER DIGESTIVE TRACT. (Sp.) Palacio, E. J. (Sch. Med., Buenos Aires, Argentina), A. E. Alzugaray and P. O. Bolo. *Prensa Med. Argent.* 58(23):1143-1145, 1971.

10836 EDWARDSIELLA TARDA ASSOCIATED WITH HUMAN DISEASE. (E.) Bockemuhl, J. (U. Wurzburg Inst. Hyg. Microbiol., Germany), R. Pan Urai and F. Burkhardt. *Pathol. Microbiol. (Basel)* 37(5):393-401, 1971.

10837 IMPORTANCE OF THE FORM OF ADMINISTRATION OF DIGESTIVE ENZYMES. (Ger.) Mulhens, K. J. (Inst. Microbiol., Res., Hamburg, Germany). *Med. Klin.* 66(33-34):1123-1129, 1971.

10838 PHYSICAL DISEASE IN ALCOHOLISM. INITIAL SURVEY OF 1,000 PATIENTS. (E.) Wilkinson, P. (St. Vincent's Hosp., Melbourne, Australia), A. Kornaczewski, J. G. Rankin and J. N. Santamaria. *Med. J. Aust.* 1(23):1217-1223, 1971.

10839 BISMUTH PECTATE: RESULTS OF CLINICAL APPLICATIONS IN 30 CASES OF ESOPHAGEAL AND GASTROINTESTINAL DISEASE. (Fr.) Delman *Med. Interne* 6(11):723-724, 1971.

10840 ENDOCRINE METABOLIC RESPONSE TO STRESS. SEQUENTIAL POSTABSORPTIVE LEVELS. (E.) Devlin, J. G., M. Moloney and M. Grant. *Ir. J. Med. Sci.* 140(7):323-326, 1971.

10841 MORPHOLOGIC CHANGES INDUCED IN THE GUINEA PIG INTESTINAL TRACT BY ENTERALLY ADMINISTERED DYSENTERY ENDOTOXIN. (E.) Bibinova, L. S. (Inst. Exp. Med., Leningrad, USSR), Z. M. Kruglikhina and N. S. Nikulnikova. *J. Hyg. Epidemiol. Microbiol. Immunol. (Praha)* 15(2): 212-219, 1971.

10842 PECULIARITIES OF IRON DEFICIENCY ANAEMIA WITH GASTROINTESTINAL DISORDERS. (E.) Afanassiev, A. (Kalavati Saran Child. Hosp., New Delhi, India), A. Sadovskaia and V. Karetnii. *Mediscope* 13(12):569-573, 1971.

10843 GASTROENTEROLOGIC COMPLICATIONS AFTER RENAL TRANSPLANTS. (It.) Minale, C. (U. Zurich, Switzerland) and F. Largiader. *Minerva Chir.* 26(11):593-596, 1971.

10844 CATHARTIC DISEASE. (Fr.) Balmes, A. (Clin. Propedeut. Med., Montpellier, France), J. Dauverchain and J. Othoniel. *J. Med. Montpellier* 6(8):443-447, 1971.

10845 EXPERIMENTAL CHOLERA IN INFANT RABBIT: DIARRHOEA OR DIURESIS. (E.) Finkelstein, R. A. (U. Texas Southwest. Med. Sch., Dallas). *Indian J. Med. Res.* 59(1):50-53, 1971.

10846 A CASE OF RECURRENT POLYSEROSITIS AND AMYLOIDOSIS AND STEATORRHOEA IN A DUTCH BOY. (E.) Scholten, J. H. (Univ. Hosp., Groningen, Netherlands), L. B. Van Der Slikke, L. Ruinen and E. Mandema. *Folia Med. Neerl.* 14(4):132-138, 1971.

10847 ENDOSCOPIC ASPECT OF CRONKHITE CANADA SYNDROME. (E.) Classen, M. (U. Erlangen Dept. Med., Germany) and W. Rosch. *Endoscopy* 3(3):162-165, 1971.

10848 OSLER-RENDU-WEBER'S DISEASE AND GASTROINTESTINAL HEMORRHAGE. (Ger.) Figus, A. I. (Jaszbereny Hosp., Hungary) and L. Simon. *Endoscopy* 3(3):159-161, 1971.

10849 TRICHOBEZOAR AND PELLAGRA. (Ger.) Glasel, E. (U. Rostock Med. Clin., Germany), E. Moldenhauer, P. Pietsch and W. Moldenhauer. *Dtsch. Z. Verdau. Stoffwechselkr.* 31(1):23-31, 1971.

10850 COMPLETE PERSISTENCE OF THE ENTEROCHORDAL JUNCTION. (Cz.) Karpenko, A. (Charles U. Fac. Pediatr. Med., Prague). *Cesk. Patol.* 7(3):126-131, 1971.

10851 CHANGES IN THE COAGULATION AND ANTICOAGULATION CAPACITY OF BLOOD INDUCED BY EARLY REOPERATION ON ABDOMINAL ORGANS. (Cz.) Fedinec, A. V. (State U. Dept. Spec. Surg., Uzhorod, USSR) and M. N. Polazinec. *Cesk. Gastroenterol. Vyz.* 25(6):253-255, 1971.

10852 RETROPERITONEAL FIBROSIS. RESPONSE TO CORTICOSTEROID THERAPY. (E.) Morandi, L. P. (Univ. Hosp., Zurich, Switzerland) and P. J. Grob. *Arch. Intern. Med.* 128(2):295-298, 1971.

10853 LACTOSE INTOLERANCE AND PROTEIN MALNUTRITION. (E.) Dahlqvist, A. (Univ. Hosp., Lund, Sweden) and B. Lindquist. *Acta Paediatr. Scand.* 60(4):488-494, 1971.

10854 FUNCTIONAL DISORDERS OF THE DIGESTIVE TRACT IN INFANTS. (Fr.) Satge, P. (Inst. Child. Health, Paris), R. Narbouton and C. Crumiere. *Gaz. Med. Fr.* 78(29):4775-4784, 1971.

10855 ACUTE HEMORRHAGE OF THE INTESTINAL TRACT. (It.) Loddi, L. (U. Florence Geriatr. Surg. Clin., Italy) and U. Modigliani. *G. Gerontol.* 19(Suppl. 45):115-122, 1971.

See also numbers: 10389, 10738, 10816

10856 FATAL POSTPARTUM AMOEBIC COLITIS WITH TROPHOZOITES PRESENT IN PERITONEAL FLUID. (E.) Rivera, R. A. (George Washington U. Sch. Med., Washington, D. C.). *Gastroenterology* 62(2):314-317, 1972.

A 28-yr-old Negro female presented in premature labor. Physical examination was unremarkable other than for temperature of 101.5°F. For an E. coli urinary tract infection she received ampicillin at 1 g i.v. every 6 hr. She delivered spontaneously after 48 hr, still with a fever, and the next day developed low abdominal cramps, with increasing tenderness and the onset of bloody diarrhea 2 days later. Urine and stool cultures, stools for ova and parasites and febrile agglutinism were negative. On sigmoidoscopy, free creamy pus at higher than 17 cm grew out pure coagulase-positive hemolytic S. aureus and she was started on p.o. vancomycin, 0.5 g every 4 hr. Her fever and abdominal pain and tenderness worsened, with localization in the right upper quadrant. A liver scan revealed 2 separate adjacent defects in the right lobe, and i.v. cephalothin (250 mg every 4 hr) and gentamycin (40 g i.m. every 8 hr) were added. Liver function tests were normal other than an albumin of 0.7 g/100 ml. Search of stool concentrates showed trophozoites of Entameba histolytica, and amebic serology revealed a complement fixation titer of 1:32 and an indirect hemagglutination titer of 1:8192. Emetine was started at 65 mg/day, but she worsened, developing ascites. At culdocentesis, 200 ml of amber-colored fluid contained the trophozoites. A dumbell-shaped mass occupied both upper quadrants and she continued to worsen despite metronidazole (750 mg TID). With maximal abdominal distention and shortness of breath, a paracentesis revealed fecal material. At surgery, there was a purulent, gangrenous peritonitis and a multiple perforated, shredded colon was removed, with trophozites in its wall and ulcers. She died shortly thereafter.

10857 GIARDIASIS (LAMBLIASIS). (E.) Petersen, H. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 7(Suppl. 14):1-44, 1972.

The literature is reviewed (171 references) and the author reports his own study. Subjects consisted of 293 patients referred for a secretin test and 44 healthy controls. Screening of duodenal contents revealed Giardia lamblia in 19 of the 293 patients (6.7%) and in none of the controls (total of 5.6% of 337 subjects). This organism was detected in 15 of 121 who complained of diarrhea and in only 4 of 172 without diarrhea and this difference was highly significant. Among patients without recognized organic gastrointestinal disease, this organism was found in the duodenal content of 15% of those with diarrhea. The occurrence of this organism was not related to age and was slightly greater in males than in females as also was diarrhea. Cysts were found in the stools of 6 of 190 patients (3.2%) screened. About 50% of those with this organism suffered from an organic gastrointestinal disease. Most patients had experienced symptoms for more than 1 yr and diarrhea was reported by 80% of them. Some evidence of malabsorption was found in 7 of 22 patients with diarrhea. Parasitologic cure with metronidazole was seen in 1 of 20 available for suitable follow-up. Cure with the smallest dose of this agent (0.6 g/day) was seen in only 69% of the cases. This organism was considered pathogenic in one-third of the patients.

10858 MECHANISM OF FAT MALABSORPTION IN RATS INFECTED WITH Nippostrongylus brasiliensis. (E.) Gallagher, N. D. (U. Sydney Dept. Med., Australia), M. R. Playoust and L. E. A. Symons. *Gut* 12(12):1007-1010, 1971.

The effect of Nippostrongylus brasiliensis (a nematode) infection on the absorption of long-chain fatty acids was studied in rats with jejunal lesions similar to those which are observed in adult celiac disease and in vitro. Stearate absorption was markedly impaired in the nematode-infected rats, and the absorption was not affected by washing the lumen with 40 ml of isotonic saline before administering the test solution. Chromatographic separation of the jejunal mucosal lipids revealed an abnormal distribution of the radioactive label with an increased percentage in the free fatty acid fraction. There was no difference in the absorption of octanoate between the control and infected rats. In vitro, the incorporation of (1-^{14}C)-oleic acid into its esters was reduced in jejunal slices from the infested rats. The ability of the enzymes in a microsomal preparation of jejunal mucosa to convert (1-^{14}C)-palmitic acid into its fatty esters was also reduced in the infected rats. The malabsorption of fatty acid, and possibly of other nutrients, could be secondary to a defect in the maturation of the intestinal epithelium.

10859 RELATION OF GIARDIASIS TO ABNORMAL INTESTINAL STRUCTURE AND FUNCTION IN GASTROINTESTINAL IMMUNODEFICIENCY SYNDROMES. (E.) Ament, M. E. (U. Washington Dept. Med., Seattle) and C. E. Rubin. *Gastroenterology* 62(2):216-226, 1972.

Seven of 8 patients with gastrointestinal immunodeficiency (hypogammaglobulinemia) were infected with Giardia lamblia. Plasma cells were virtually absent in the small intestinal biopsies of all the patients. Three patients had the flat lesion of hypogammaglobulinemic sprue, 2 had nodular lymphoid hyperplasia and 3 had mixed lesions. The villous architecture in multiple small intestinal biopsies from the same patients often varied from normal to severely abnormal, necessitating the acquisition of many biopsies to evaluate the mucosal response to eradication of Giardia lamblia. Abnormalities in villus structure returned towards normal in 7 patients, steatorrhea disappeared in 4, and diarrhea in 3 after successful eradication of Giardia lamblia. A little-understood area of malabsorption is abnormal growth of bacteria or parasites within the lumen with little apparent invasion of the intestine itself, e.g. in giardiasis, capillariasis and stasis syndrome.

10860 INVESTIGATIONS ON THE ABSORPTION OF LABELED VITAMIN B_{12} AND LABELED ALBUMIN BY INTESTINAL PARASITES. (Pol.) Prokopczuk, J. (Med. Acad. Inst. Intern. Med., Bialystok, Poland), J. Rostafinska, C. Zietkowska and B. Zietkowski. *Wiad. Parazytol.* 17(4):343-346, 1971.

10861 HEPATIC FIBROSIS DUE TO Schistosoma mansoni IN NIGERIANS. (E.) Francis, T. I. (Univ. Coll. Hosp., Ibadan, Nigeria). *Trop. Geogr. Med.* 23(3):239-245, 1971.

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10863 CASE CONTRIBUTION TO THE CLINICAL FEATURES OF ECHINOCOCCUS OF THE LIVER. WITH SPECIAL REFERENCE TO THE OCCURRENCE OF PORTAL HYPERTENSION WITH HEMORRHAGE FROM ESOPHAGEAL VARICES. (Ger.) Klein, C. (Univ. Med. Clin., Homburg/S., Germany), H. Reikowski and D. Muting. *Med. Welt* 22(42):1647-1650, 1971.

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ABSTRACTS
AND
CITATIONS

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PREFACE

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08181* 08184* 08185* 08186* 08187* 08194 08289* 08314
08427 08477* 08480* 08489 08509 09058* 09060* 09061*
09063* 09067* 09069* 09070* 09071* 09072* 09074* 09075*
09078* 09171* 09211* 09231 09232 09289* 09379* 09380*
09383* 09399 09475 09842* 09873 09967* 09968* 09969*
09970* 09973* 09974* 09975* 09976* 09977* 09978* 09979*
09981* 09983* 09986* 09988* 09989* 09991* 09993* 09994*
09997 09998 10167* 10198* 10244 10261 10269* 10271*
10273* 10278* 10283* 10317 10324 10328 10335*
ACID SYNTHESIS.FATTY
01762 01964* 02000 05423 05424 05582 07375
ACID SYNTHESIS.LIVER NUCLEIC
00212 01094 01149 01150 01151 03768 06462* 07316*
07335* 07379 08253
ACIDOSIS
00699* 00754 05388 07833* 08197* 09857 10006* 10062*
10158* 10753
ACUTE ABDOMEN
00645 00854 01446 01690 02630 03446 04138 04478
04485 05375 05376 05378 06294 07162 07174 07999
08014* 08036 08055 08968 08981 08982 09271 10810*
10832
ACUTE ABDOMEN DIAGNOSIS
03586 06543 09620* 10451
ACUTE ABDOMEN ETIOLOGY
10862
ACUTE ABDOMEN IN CHILDREN
07695 09469
ACUTE APPENDICITIS
03264 03279 04130 04133 04139 04164 04459* 05028
05958* 07037
ACUTE HEPATITIS
00724 00725 00727 01566 02494* 03421* 03426* 03429
03434 04327* 04363 04372 04375 04376 04377* 05146*
05218 05225* 05226* 06168* 07054* 07905 07909* 07911*
08856 10692*
ACUTE PANCREATITIS
00643* 00644* 00646 00649 01472 01473 01474 01475
01476 01477 01479 01482 02424 03323* 03325* 03332
03334 03337 04239* 04241* 04242* 04243 04245 04249
04252 04253 04256 04700* 04701* 05120* 05126 05130
05131 05133 06050* 06056 06057 06058 06059 06949*
06951* 06952* 06953* 07035 07812 07813 07818 07819
08742* 08748 08749 09616* 09617* 09620* 09621* 09623
09624 09625 10531* 10532* 10533* 10539 10547 10548
ACUTE PANCREATITIS ETIOLOGY
06950* 06952*
ACUTE VIRAL HEPATITIS
00653* 00707* 00711* 00728 01575* 01576* 01577* 01579*
01583 01588 01593 02512* 02514* 02527 04360 04370
05227* 06175

ADENOMA
01428 02302
ADHESIONS
02093 04055 04475 04913* 04948 06736* 07158 08015*
08540 09430* 10337*
ADHESIVES,TISSUE
09876 10202* 10590*
ADRENAL GLANDS
00210 01023* 01024* 04501* 08497 09145 09354 09905
10096 10287 10510*
ADRENERGIC AGENTS
00108 00114 00118 00238* 00988* 01003 01174* 02755*
02764* 02765* 04575* 04581* 06426* 06427* 07105* 07206*
07264* 07266* 07475* 08143* 08179* 09038* 09085* 09106*
09172* 09190* 09191* 09949* 09955* 09959* 10004* 10344*
ADRENERGIC BLOCKING AGENTS
00238* 00988* 01003 01869* 07266* 08143* 08179* 09049
09085* 09129* 09172* 09191* 09949*
AFFERENT LOOP SYNDROME,GASTRECTOMY-INDUCED
00256* 00456* 00482 01339* 01392* 02221* 03955 06654
10284*
AFLATOXIN
SEE ALSO LIVER CARCINOGENESIS
SEE ALSO STOMACH CARCINOGENESIS
01570 04274* 04295 04336 04389* 08238* 09713* 09719
10048* 10088 10651
AGE EFFECTS ON ABDOMEN
02630
AGE EFFECTS ON ABSORPTION
00070 04559 06341* 06350* 06813* 07237* 08122* 08130*
09022* 09034 09922* 09930*
AGE EFFECTS ON BILIARY TRACT
04427 09000*
AGE EFFECTS ON GALLBLADDER
04434 09000*
AGE EFFECTS ON GASTROINTESTINAL TRACT
00074 00875 00876 02631 02681 06277 08135 08945
08946 10112*
AGE EFFECTS ON LIVER
00004* 00005* 00006* 03347* 05175 06327 06471 06487
07330* 07340* 07353 07354 07363 07392 07416 07886
08258 08262 08273 09001* 09020 09126*
AGE EFFECTS ON PANCREAS
02825 03315 04617* 06317 06428 08208 10000*
AGE EFFECTS ON RECTUM
07214
AGE EFFECTS ON SMALL INTESTINE
03801* 03811 04684 06347* 07220 09003* 09019 09170*
10104* 10108 10122* 10399*
AGE EFFECTS ON STOMACH
03986 03992 07627* 07628* 08147 08163*
AGE FACTORS
00075 00763* 00836 00837 00912 00926 00929 00971
00972 01036* 01143 01150 01290 01632 01686 01818
01953* 02046 02067 02101* 02218* 02255* 02379 02404*
02630 02631 02670 02903 03529 03586 03599 03665
03801* 03986 03992 04013 04411* 04427 05175 05392
05419 05748 05787 06798* 07663 08010 08087* 08298
08912 09337 09585* 09626 10185 10517 10649
AGE FACTORS IN APPENDICITIS
10461
AGE FACTORS IN CANCER
06616* 06621* 10204*
AGE FACTORS IN CHOLELITHIASIS
00785 00786 02570* 07990
AGE FACTORS IN PEPTIC ULCERS
00464 04884 08490 09386 10295
AGE FACTORS IN ULCERS
06682*
ALBUMIN
SEE ALSO LIVER
SEE ALSO PLASMA PROTEINS
01976* 02042 02340 02741* 03239 03826* 04655 06328
06335 06411* 06414* 06425* 06464* 06606* 07244* 07383
07384 08867* 10040* 10536*
ALCOHOL
SEE ALSO FATTY LIVER
SEE ALSO PANCREATITIS
00120 00791 00996 01668* 03125* 03550 04423* 07040*
07288* 07304* 07581* 07880 09088* 09114* 09127* 09376*
09512* 10665 10672* 10838
ALCOHOL ABSORPTION
04088 04549* 09928*
ALCOHOL EFFECTS ON LIVER
00661* 00737* 00738* 00741* 00742 00743 00744 00746
00753 01558* 01566 01567 01606* 01619 01973* 01974*
02036 02037 02038 02425* 02445* 02451* 02475 02494*
02496 02559* 03407* 03416 03417 03458* 03780 04325*
04326* 04327* 04328* 04390* 04392* 04394* 04635* 04650*
04654 05210* 05214* 05272* 05280 05589 06147 06149
06155 06159 06445* 07028 07040* 07045 07100 07317*
07345* 07348* 07355 07394 07508 07856 07861 07896*
07958* 08226* 08277 08282 08803 08823* 08856 08867*
09056 09107* 09113* 09638* 09643* 09649* 09684 09722
09787 10027* 10038* 10042* 10043* 10044* 10051* 10072*
10076* 10583* 10633 10635 10673* 10675* 10738* 10806*
ALCOHOL EFFECTS ON LIVER
CONTINUED
10838
ALCOHOL EFFECTS ON PANCREAS
00644* 01057* 01058* 04239* 04240* 07040* 10513*
ALCOHOL EFFECTS ON SMALL INTESTINE
01669* 02896* 05454* 05601* 07453*
ALCOHOL EFFECTS ON STOMACH
01322 02220*
ALCOHOL IN CIRRHOSIS
00737* 00745 01600* 01604* 01610* 01617 01618 01765
02563* 02565 02567 02568 04398 04403 06189* 07090*
07099 07827* 10426* 10513* 10584* 10737*
ALCOHOL METABOLISM
00392* 04677* 06440* 07341* 07345* 07431 07453* 07896*
07958* 09128* 09972*
ALCOHOLIC PANCREATITIS
03328 10535* 10538*
ALCOHOLIC STEATOSIS
08856
ALKALINE PHOSPHATASE
06540* 07477* 07492* 07530 08286* 09894* 10110 10122*
10217
ALKALOSIS
04482 10062* 10844
ALLERGIES
SEE ALSO IMMUNOLOGY
00552* 00558 00609* 00827* 00877 01569 01769 02675
03197 03619 03722 03726 04097 04098 04332 06823
07773 09683 09889 10605
AMEBIASIS
00891* 02687* 02688 02692 02693 02696 02697 03827*
04494 05971 06007 06130 06131 06132 06142 06245
06286 06287 06288 07019 08987* 09598 10864 10870
AMEBIASIS DIAGNOSIS
00900 08069 08724 09649* 09656* 09887 10856* 10868
AMEBIASIS EFFECTS ON LIVER
00895 05203 07199 08069 09649* 09658* 09884 09885
09887 09890
AMEBIASIS IMMUNOLOGY
00900
AMEBIASIS PATHOLOGY
05394*
AMEBIASIS TREATMENT
00894 01785 01786 04285 05351 07169 08654* 08991
10856*
AMINO ACID ABSORPTION
SEE ALSO PROTEIN ABSORPTION
00044* 00052* 00053* 00058* 00062* 00075 00078 00082
00945* 00966 00967 01664* 01841* 01842* 01846* 02055*
02056* 02081* 02342 02343 02739* 04540* 06260* 06262*
06344* 06362 06363 07246* 07256 07261 08112* 08132
08134 09032 09033 09922* 09931* 09939* 09940* 10015*
10401*
AMINO ACID METABOLISM
00151* 00216 00575* 01105 01663* 02018 02055* 02891*
04602* 05522 08194 08209 09858
AMINO ACID METABOLISM,LIVER
01081* 01097 01098 02021 02022 03759* 05544* 06332
06498 07330* 07344* 07369 07837* 08257 09157 09160
10019* 10046* 10047* 10080
AMINO ACIDS
00162 02004 02005 02013 02799* 06432* 06513* 07084*
07473* 10007* 10109
AMINOPEPTIDASE,LEUCINE
07148*
AMMONIA
02444* 06231 07161
AMMONIA ABSORPTION
00954* 01845* 06186*
AMMONIA EXCRETION,LIVER
00220 00669 02444* 05147* 05282 07329* 07847* 08225*
09661 10553* 10701
AMPULLA OF VATER
SEE ALSO BILIARY TRACT
00517 01366* 01630 02595 02601 03541 03542 07129
08002 09212* 10338* 10796 10801
AMYLASE
SEE ALSO PANCREAS
00266* 01943 02820* 07015 09055*
AMYLASE SECRETION,PANCREAS
00268* 00639* 01050* 01938* 02817* 02820* 04615* 04617*
04689* 04690* 05119* 05123* 05526* 08203* 09999* 10009*
AMYLASE,SERUM
00268* 01198* 03355* 09087* 09142 09197* 09639* 10003*
10137* 10533* 10536*
AMYLOIDOSIS
01685* 01709 01710 02664 03077 03087 04102* 04793
06009 06069* 06282 08022 10453 10814* 10822 10846
ANASTAMOSIS
00509* 00572* 00689 00741* 00771*
ANASTOMOSIS
01417* 01418* 01419* 01447 01610* 01641 01703 02051*
02267* 02284* 02349* 02402* 06755 07650* 07651* 07683
08433 08465 08677 09117* 09574 10116* 10267* 10373
10391* 10444

ANASTOMOTIC ULCERS
08464
ANEMIA
SEE ALSO FOLIC ACID
SEE ALSO LIVER DISEASES
SEE ALSO MALABSORPTION TREATMENT
SEE ALSO VITAMIN B12
02293 02336* 04045 04077* 06444* 06819* 08062 08366
08933* 09303* 09736 09749 10389*
ANEMIA,APLASTIC
07067 10708
ANEMIA,GASTRECTOMY-INDUCED
08413 08503
ANEMIA,HEMOLYTIC
01652* 04208* 07044 07856 08878 09340 09604 10123*
10623 10724
ANEMIA,IRON DEFICIENCY
05771* 06669 08988* 09493 10198* 10842
ANEMIA,PERNICIOUS
00014* 01651* 01653* 01781 02095* 02222* 02791* 03046*
03700* 03709* 04777* 06524* 07584* 07586* 08390* 08411
08452 09209* 10809*
ANESTHESIA
01032* 04911 06592 06721 09997 10331* 10774
ANESTHESIA IN ENDOSCOPY
07486*
ANESTHETICS IN LIVER INJURIES
00700* 01569 03772 05209* 05551* 05555* 06148 07044
09118* 09715* 09898
ANEURYSMS
00681 00682 03336 04268* 07890 07979* 09307 09629
09702 09783
ANEURYSMS,AORTIC
06749 08571 09254
ANGINA,ABDOMEN
SEE MESENTERY VASCULAR DISEASES
ANGIOGRAPHY
00355 00686 01214 01215 01263 01264 01265 01266
01269 01270 01481 03282 03820 03821 06565 08568
10358
ANGIOGRAPHY IN CANCER DIAGNOSIS
06557 07107* 07528 07604 08014* 08735 08777 09599*
09602 09613 10135* 10524
ANGIOGRAPHY,ABDOMEN
00320 00351 02153 02177 02179 02928 02988 04463
05373 06545 06547 06548 07504 07507 07528 07885
08311 08829* 09219 09877 09909 10624
ANGIOGRAPHY,BILIARY TRACT
02178 04421* 04715 05651* 07115
ANGIOGRAPHY,GASTROINTESTINAL
01723 02950 02975 06549 07156* 07515 09225 09460
10135*
ANGIOGRAPHY,LARGE INTESTINE
00617 05687 06875 08664 10445
ANGIOGRAPHY,LIVER
00356 02105* 02146 02147 02150 02915* 02932 02951
02952 03375 03376 03381 03477 05144* 05696 06083
06085 06086 06529* 06978 06979 06983 07127 07521
07825* 07899* 07900* 08830* 08985* 09193 09196 09638*
09647* 09656* 09657* 09670 09907 10135* 10577* 10607
10650 10726*
ANGIOGRAPHY,MESENTERY
02176 05698 06529* 06557 07526 07890 08712 08720
09428* 09704 10127 10147 10150 10333* 10386 10550
10570* 10818*
ANGIOGRAPHY,PANCREAS
02918* 02954 04250 04254 05135 05645* 05690 06045
06048 06930 06931 08735 09195 09602 09607 09613
10524 10525
ANGIOGRAPHY,SMALL INTESTINE
00520 00522 02121 04912* 04915* 05904 06772 07227
08563
ANGIOGRAPHY,STOMACH
02088 02233 04818 06630
ANGIOMA
08002 08664 09423*
ANICTERIC HEPATITIS
07912* 07938 10684* 10695*
ANOMALIES,ABDOMEN
00833 06263* 06269 07177
ANOMALIES,ANUS
01449 04188 05056 05082 05977 07741 07767 08647*
09514*
ANOMALIES,BILIARY TRACT
00773* 00774* 00816 00824 01631 02581 03488* 03496*
03505 03520 03523 03528 04420* 04949 06214* 06216*
06218* 06227 06228 06230 06231 07126 07136 07142
07995 09807* 09809 09815 10581*
ANOMALIES,CONGENITAL
00532 00586 00662* 00773* 00774* 00806 00823 00832
00833 01302 01368* 01420* 01449 01450 01451 01500
01697 01698 02179 02204 02285* 02305 02432* 02487
02581 02588 02598 02629 02673 03160 04113* 04260*
04916* 04961 04981 05179 05327 05360 05765* 05780
05803 05807 05816 05867 06005 06044 06047 06093
06227 06228 06269 06590 06776 06817* 06819* 06839*
ANOMALIES,CONGENITAL
CONTINUED
06674 06926* 06962* 06975* 07125 07136 07539* 07795*
07826* 07837* 07844* 07862 07868 07897* 07960 08342
08356 08382 08401 08429 08455 08472 06958 09264
09267 09269 09281 09343 09345 09393 09435 09456
09492 09807* 09825 10158* 10197* 10368 10422 10477
10600 10618 10745 10850
ANOMALIES,DUODENUM
00502* 03147* 03161 04047 05862 05903 08542 08550
08590 08591
ANOMALIES,ESOPHAGUS
00371 00374 01295 02977 03035 03876 03885 04731*
04759 05720* 05723* 05724* 05730 05761 07538* 10187
10850
ANOMALIES,GALLBLADDER
00323 00819 00822 02603 05323 06227 07125 07127
07983* 08591 08710 09829 09834 10758* 10798
ANOMALIES,GASTROINTESTINAL
00368 02657 02658 02673 03592 05356 05357 05359
05360 06263* 06269 07170
ANOMALIES,LARGE INTESTINE
01420* 02368 03235 03275 03467 04064 04198 05042
05044 05051 05065 05642* 05889 05973 05977 05979
06005 06016 06898 07731 08710 09524* 09538 09565
10497
ANOMALIES,LIVER
00323 01500 03958 04420* 05726 06082 06093 06227
07007
ANOMALIES,MESENTERY
05380 06545
ANOMALIES,PANCREAS
02307 02416 03074 03307 03317 04221 04223 04226
04949 05110 05786 06038 06041 06047 06926* 06940
09356 10514 10515
ANOMALIES,RECTUM
03217* 03218* 03237 04188 05642* 06851 06896 07741
ANOMALIES,SMALL INTESTINE
02286* 02305 02306 02674 03167 04029 04047 04061
04064 04916* 04932 04933 04949 04961 05360 05867
05884 05889 05903 05910 07649* 08620* 10350 10360
ANOMALIES,STOMACH
01295 01302 02242 03063 03074 03085 03161 03875
04782 04785 04790 04821 05765* 05766* 05780 05803
05807 05816 06038 08429 08455 09333 09362 10233
ANORECTAL FISTULAS
09549
ANORECTAL SURGERY
07741 07759 07768 07772 08673 09527* 10432* 10435*
10439* 10440* 10441* 10456
ANOREXIA
10124*
ANTACIDS
01355 02094* 02239 03107 03119* 03126* 03973* 03974*
03999 05507* 06348* 08166* 08477* 09348 09370 09419
09427* 09966* 10313
ANTIBIOTICS
00037* 00083 00200* 00211 00221 00231* 00965 00969
01220 01587 01736 02034 02071 02079* 02085* 02356*
03072 04174 04209* 04486 04576* 04861* 05437* 06014
06119 06256* 06454* 06483 07180 07208* 07391 07997
08019* 08120* 08483* 08533 08825* 09297* 09522* 09867
09872 09940* 10034* 10059* 10065* 10112* 10553*
ANTIBIOTICS IN LIVER INJURIES
07334* 07892* 09642*
ANTIBIOTICS IN MALABSORPTION TREATMENT
07712* 10114* 10406*
ANTIBODIES
00241* 01579* 08122*
ANTIBODY,GASTRIC PARIETAL-CELL
06609* 08390* 10200* 10220
ANTIBODY,INTRINSIC FACTOR
00014* 03700* 08390* 10200* 10220
ANTICHOLINERGIC AGENTS
00307 00426 00432* 00529 01004 01028* 01331* 03855
04569* 04588 05340* 07633 09171* 09927* 09935* 09955*
09990* 10279*
ANTICOAGULANTS
00051*
ANTIEMETICS
SEE ALSO VOMITING
00530 01744
ANTIMETABOLITES
00193* 02020 10016*
ANTISECRETORY AGENTS
10279*
ANTISPASMODICS
00864 00865 00866 00867 01741 01742 06381 08095
ANTRECTOMY
00152* 00443* 01017* 01022* 06688* 08099 09327 09974*
10196* 10247 10269* 10283*
ANTRUM,PYLORIC
07268* 07627* 09211* 09957* 09961* 09990* 10215

ANUS
05483 05966 05586
ANUS ANOMALIES
01449 04186 05056 05082 05977 07741 07767 08647*
09514*
ANUS CANCER
03238 04192 06847 07768
ANUS DIAGNOSIS
10443*
ANUS DISEASE
03245
ANUS DISEASES
01442 04197 05079 07742 07744 07746 07766 07771
08660* 10433* 10435* 10487
ANUS FISSURES
02393 06870 08647* 10494
ANUS FISTULAS
00588 01443 01444 03219* 04192 09533
ANUS HISTOLOGY
04197
ANUS IN CHILDREN
06892 06901 08647*
ANUS INJURIES
10442*
ANUS MORPHOLOGY
03614 08660*
ANUS MOTILITY
08660*
ANUS NEOPLASMS
04180 05074
ANUS NEOPLASMS,MALIGNANT
00585 07732 07735 07743 07759 08697 09533 09534
ANUS RADIOLOGY
SEE ANUS DIAGNOSIS
ANUS SPHINCTER
03280 04135 04152 04188 06892 08660* 10442* 10443*
ANUS SURGERY
01442 01444 03219* 05079 06870 06901 07730 07732
10442* 10494
ANUS TREATMENT
04104* 07772 08649* 09550 10483
ANUS,NERVOUS CONTROL OF
04104* 05079
AORTIC ANEURYSMS
06749 08571 09254
APLASTIC ANEMIA
07067 10708
APPENDECTOMY
05999 06886
APPENDICITIS
00596 02364 03284 04148 04195 05019* 05043 05998
06858 07761 07765 08668 08676 09545 09578 10471
APPENDICITIS COMPLICATIONS
04131 04133 05011* 05959* 08683 09530 09545
APPENDICITIS DIAGNOSIS
01226 02363 05689 07495 07517 08680 08681 08689
10451
APPENDICITIS EPIDEMIOLOGY
08676
APPENDICITIS ETIOLOGY
05958* 06004 07784 09870
APPENDICITIS IN CHILDREN
04130 04164 04189 05011* 05028 05689 05959* 06004
06900 07203 07495 09567
APPENDICITIS TREATMENT
04139 08678 08690
APPENDICITIS,ACUTE
03264 03279 04130 04133 04139 04164 04459* 05028
05958* 07037
APPENDICITIS,AGE FACTORS IN
10461
APPENDIX
00542 00580 01183 01184 01425 01426 01450 01451
01818 02352* 02360 02361 02362 02600 03182* 03222*
03230 03271 03279 04142 04181 04202 05019* 05041
05044 05051 06854 06884 06904 07747 07751 08659*
08682 08684 08708 08717 09516* 10477
APPENDIX CANCER
00579 08709 09542
APPENDIX CYSTS
08702
APPENDIX IN CHILDREN
02366
APPENDIX SURGERY
02365 02366 04140 04145 06854 08645* 08667 08668
08670 08678 08679 08688 08690 08702
APPETITE
01743 06382 10124*
ASCITES
SEE ALSO CIRRHOSIS
01674* 02436* 02451* 02454 02465 02619* 03306 03322*
04229 04395* 04488 05108 05162 05167 05265* 05275
05285 06201 07164 08969 09608 09861 10673* 10675*
ASCITES IN CIRRHOSIS
00757 01487* 02561* 03464* 05270* 05273* 07099 07955*
08864* 08866* 09780* 09792 10733* 10752
ASCITES TREATMENT
02561* 05270* 05273*
ATHEROSCLEROSIS
03485 07102 07877 08028 09220
ATRESIA,BILIARY TRACT
03356 03488* 04270* 05141* 06216* 06218* 06231 06968*
07108* 07117 08889 09802* 09816 10662 10803
ATRESIA,ESOPHAGUS
00368 00369 00370 02108 02977 03876 04731* 04737
04739 04744 04752 04753 05730 05757 05761 06594
07542* 08342 09255 09261 09269 10163* 10164* 10183
ATRESIA,LARGE INTESTINE
02938 05642* 09450
ATRESIA,SMALL INTESTINE
00502* 00532 01367* 01368* 01377 05883 05903 07687
09450 09453 09456
ATRESIA,STOMACH
05803 05816
ATROPHIC GASTRITIS
00394* 00419 00420 00421 00422 00423 00441* 00466
01317 01320 03048* 03915 05763* 06610* 07582 07584*
08403 08480* 09295* 09301* 09303* 09351 09364 09370
10200* 10203* 10258
ATROPINE
00033* 00180 00529 01028* 01959* 02744* 02754* 02760*
06410* 07290* 08481* 09129* 09189* 09935* 09950* 09969*
10008* 10280*
AUTONOMIC NERVOUS SYSTEM
00001* 00022 00023 00025 00854 01170* 01709 01867*
01903* 01917* 01918* 02445* 02730 03945 08486* 08950
10174 10210

BACTERIA
SEE ALSO MICROORGANISMS
02084* 02580* 02610* 02614* 02633 02683 02686 04277*
04682 05197 05269* 05608* 05613 05637* 06256* 06266
06275 07282* 08789 08791 09449 09571 09661 09686
09843* 09853 10046* 10587* 10645 10653 10827 10831
BACTERIAL TOXINS
00060* 00061* 01625* 06506* 07152* 07652* 07655* 08527*
09049 09424* 09849* 09936* 10811* 10841
BALANCE STUDIES,METABOLIC
06354* 06819* 07317* 07619* 07794* 10730*
BANTIS DISEASE
08446
BENIGN ABDOMEN NEOPLASMS
06267
BENIGN BILIARY TRACT NEOPLASMS
00781
BENIGN DUODENUM NEOPLASMS
01391 06748 07750
BENIGN ESOPHAGUS NEOPLASMS
01285 01286 06574 08359 09248 10176
BENIGN GALLBLADDER NEOPLASMS
04451 05332 07141 08892 10800
BENIGN GASTROINTESTINAL NEOPLASMS
01728
BENIGN LARGE INTESTINE NEOPLASMS
00576* 05032 05058 06000 07723* 08708 09528* 10457
10476
BENIGN LARGE INTESTINE TUMORS
05993
BENIGN LIVER NEOPLASMS
05191 06083 06133 07881 10602
BENIGN MESENTERY NEOPLASMS
08043
BENIGN PANCREAS NEOPLASMS
06935 06943 10527
BENIGN RECTUM NEOPLASMS
06850 06853 07723*
BENIGN SMALL INTESTINE NEOPLASMS
00521 01389 02302 03117 06751 06787 07662 09446
BENIGN STOMACH NEOPLASMS
00398 00402 00405 01312 02226 03117 03913 04778*
04837 06632 06640 06643 08414 08459 09315 09324
09373 10215 10216
BEZOARS
03900* 03911* 03949 03966 04835 05781 05788 06627
07591 08374 08398 08529* 09316 09855 10849
BICARBONATE
09941 09984* 10103* 10275*
BICARBONATE SECRETION
05498*
BICARBONATE SECRETION,PANCREAS
00182 01910* 01911* 01935* 01941* 01942* 02134 07303*
08197* 08198* 08201* 09089* 09092* 09213* 10007*
BILE
00034* 00196* 00970 01528 03353* 05436* 08482* 08740*
09018 10651
BILE ACID ABSORPTION
05309 09804* 10807*

BILE ACID METABOLISM
02571* 03459* 03744* 03752* 03774 04412* 04638* 05640*
06218* 06437* 07311* 07331* 07332* 07333* 07971* 07978*
08240* 08285* 08589 08755* 09112* 09120* 10765*
BILE ACIDS
01070* 02441* 02844* 03351* 03488* 03495* 05588 05608*
06257* 06695* 07017 07315* 07454* 08255 09110* 09645*
09770 09841* 09911* 10052* 10762* 10769*
BILE ACIDS AND SALTS
00035* 00068 00138* 00225 00227 00274* 00769* 00817
01073* 01086* 01138 01139 01140 01141 01156* 01196*
01969* 02834* 02835* 02878 03755* 04236* 04278* 04412*
04415* 04542* 04543* 04621* 04634* 04648* 04659 05333*
08792
BILE ANALYSIS
00761* 00769* 03501 03515 04651* 05333* 05588 07343*
07490* 07978* 08220* 08221* 08930 10071* 10094
BILE COMPOSITION
01136 01622* 02574* 02582 02590 02834* 03491* 03757*
03766 04236* 04409* 04415* 04418* 04637* 05451* 06064*
06494 07109* 07130 07310* 07343* 07476* 07490* 07971*
07982* 08128* 08211 08213* 08218* 08219* 08251* 08885*
09104* 09109* 09645* 09652* 09837 10020* 10026* 10044*
10045* 10050* 10077* 10094 10098 10120* 10560* 10762*
10767* 10769*
BILE DUCT
SEE ALSO BILIARY TRACT
02598 02602 04408*
BILE DUCT,COMMON
SEE ALSO BILIARY TRACT
00770* 00772* 00806 00823 02446* 02588 02600 02601
03490* 03493* 03496* 03502 03525 03528 03539 03540
03646* 03681* 03930 04408* 04413* 04425 04442 04446
04563* 04571* 04572* 05289* 05290* 05301 05302 05312
05471* 06061* 06214* 06225 06228 06232 06237 06242
06249 06254 07110* 07142 07503 09138* 09189* 10067*
10759*
BILE EXCRETION
01074* 01075* 01077* 01965* 01967* 02858* 03829* 04235*
04657 04659 07332* 07705* 07788* 09912* 10807*
BILE METABOLISM
01137 01138 01139 03646* 04637* 08128* 08884*
BILE METABOLITES,URINARY
07332* 07830* 08328
BILE MICROORGANISMS
07977*
BILE PERITONITIS
04439 08920 09813 10775
BILE PIGMENTS
SEE ALSO BILIRUBIN
SEE ALSO CHOLESTASIS
00223 01539 01962* 02446* 02858* 06511* 08221* 09407
BILE PIGMENTS IN JAUNDICE,SERUM
00274* 02845* 02851* 04419* 05546* 06964* 08758*
BILE PIGMENTS,SERUM
02447* 02835* 04311 04704* 05307 09204* 09214* 09680
10073* 10612 10613 10617
BILE SALT ABSORPTION
00942* 00958* 07254* 07982* 08113* 09912* 09919*
BILE SALT METABOLISM
04648* 08521* 10020* 10120* 10586*
BILE SALTS
SEE ALSO BILE ACIDS AND SALTS
00058* 00766* 00787 00943* 00957* 01072* 01137 01362
01469* 01858 01890 01955* 01956* 01964* 01975* 02334*
02335* 02628 02744* 03186* 05295* 06424* 06425* 06463*
06811* 06915* 07251* 07255* 07309* 07658* 08117* 09136*
10030* 10035* 10077* 10079
BILE SECRETION
00187 00194* 00197* 00792 00793 01026* 01071* 01072*
01076* 01077* 01080* 01086* 01142 01145 01148 01949
01956* 01959* 01961* 01968* 02038 02249* 02582 02844*
02850* 03710* 03744* 03755* 03760* 03771 04248 04637*
04642* 04667 05529* 06446* 06448* 06449* 06450* 06452*
06463* 06473 06480 06496 06508* 07095 07104* 07310*
07326* 07348* 07349* 07473* 07867 07973* 08219* 08232*
08246* 08266 08884* 09089* 09092* 09104* 09105* 09120*
09122* 09136* 09645* 09896* 10026* 10034* 10037* 10044*
10064* 10088 10120*
BILE SECRETION,DRUG EFFECTS ON
02591 03757* 06465* 07315* 07338* 08244* 08884* 09153
BILE,DIGESTIVE ACTION OF
07706* 08755*
BILIARY CIRRHOSIS
02440* 02557* 05271* 05300 05650* 07953* 09711* 09786
09790 10576* 10736* 10739*
BILIARY DISEASE DIAGNOSIS
00796 00797 00821 04421* 04694* 04703* 04707 04710
04722 05173 05289* 05290* 05292* 05297* 05650* 05651*
06998
BILIARY DISEASE EPIDEMIOLOGY
00776* 01621* 05287*
BILIARY DISEASE ETIOLOGY
02050* 04422* 07117
BILIARY DISEASE IN CHILDREN
04421* 07106* 07488*
BILIARY DISEASE TREATMENT
00814 01637 04429 04444 05294* 05369 08966
BILIARY DISEASES
04422* 08755* 10655
BILIARY ILEUS
00798 00801 01636 09803* 09824 10793
BILIARY TRACT
SEE ALSO CHOLECYSTITIS
SEE ALSO CHOLELITHIASIS
SEE ALSO GALLBLADDER
02442* 03449
BILIARY TRACT ABSORPTION
03646* 07258
BILIARY TRACT ANGIOGRAPHY
02178 04421* 04715 05651* 07115
BILIARY TRACT ANOMALIES
00773* 00774* 00816 00824 01631 02581 03488* 03496*
03505 03520 03523 03528 04420* 04949 06214* 06216*
06218* 06227 06228 06230 06231 07126 07136 07142
07995 09807* 09809 09815 10581*
BILIARY TRACT ATRESIA
03356 03488* 04270* 05141* 06216* 06218* 06231 06968*
07108* 07117 08889 09802* 09816 10662 10803
BILIARY TRACT BIOCHEMISTRY
01783* 01962* 10030*
BILIARY TRACT CANCER
02602 02617* 03490* 03512 03534 03538 03541 03542
03850 05313 05651* 06233 06251 06252 08909 10772*
10813*
BILIARY TRACT CIRCULATION
02911* 03511 04420* 04421* 07126 09154 09192
BILIARY TRACT CYSTS
01634 03496* 03540 06214* 06249 06962* 07136 07995
08034 08903 09806* 09808* 09825 09831 10581*
BILIARY TRACT DIAGNOSIS
00274* 00331 00333 00337 00339 00340 00341 00342
01203* 01204* 01251 01252 01253 01255 01257 01258
01259 01260 01262 01633 01637 01639 02154 02155
02156 02157 02158 02160 02162 02163 02164 02913*
02922 02926 03512 03520 03829* 03839 04715 05312
05588 05660* 05707 06223* 06234 06254 06532* 07108*
07129 07479* 07488* 07522 07981* 08000 08906 09794*
09798* 09802* 10134*
BILIARY TRACT DISEASE DIAGNOSIS
03829*
BILIARY TRACT DISEASE ETIOLOGY
01621* 01622* 01967*
BILIARY TRACT DISEASES
00799 00800 00811 00881 01632 01633 01783* 01793
02588 02593 02598 02615* 03390 03593 03599 04416*
04425 04444 04453 04646* 05121* 05328 05332 05374
06229 06253 06254 06950* 07015 07026 07113* 08897
08910 08927 09823 09833 10759* 10781 10782
BILIARY TRACT ENDOSCOPY
00340 10145
BILIARY TRACT EXCRETION
00221 00229 01957* 01966* 02843* 03495* 05559
BILIARY TRACT FISTULAS
00766* 00801 00802 03522 03645* 04430 07131 07522
08491 08898 09716* 09803* 09838
BILIARY TRACT HISTOLOGY
06335 07121 07349*
BILIARY TRACT IMMUNOLOGY
00777*
BILIARY TRACT IN CHILDREN
00795 05330 06214* 06216* 06250 10662 10774 10803
BILIARY TRACT INJURIES
03930 05370 08919
BILIARY TRACT METABOLISM
00225 01080* 01962* 01968* 01969* 01975* 02034 03744*
04634* 05600
BILIARY TRACT MICROORGANISMS
00777* 02580* 03500 03501 06245 07133 07974* 10768*
BILIARY TRACT MORPHOLOGY
02765* 04413* 04424 04509* 05402* 09000* 09636* 10676*
10779
BILIARY TRACT MOTILITY
00090* 00108 00109 00342 01889 02763* 02764* 02765*
02911* 03506 03692 04445 04563* 04571* 04572* 06395
06396 06397 06452* 07104* 07105* 07265* 07349* 08927
09127* 09189* 10758*
BILIARY TRACT NEOPLASMS
00780 00782 02595 02597
BILIARY TRACT NEOPLASMS,BENIGN
00781
BILIARY TRACT NEOPLASMS,MALIGNANT
00612* 00762* 00779 00846 01630 02178 07107* 08008
08923 09793* 09800* 09806* 09814 10643 10764* 10796
BILIARY TRACT OBSTRUCTION
00331 00765* 00771* 00780 00795 01247 01624* 02446*
02583 03345* 03346* 03380 03489* 03490* 03493* 03510
03519 03527 03539 03598 03756* 04407* 04421* 04429
04448 05271* 05288* 05306 05324 06208* 06213* 06224
06232 06237 06239 06248 06250 07106* 07124 07147

BILIARY TRACT OBSTRUCTION
CONTINUED
07148* 07830* 08924 09811 09814 10067* 10516 10576*
10772*
BILIARY TRACT PATHOLOGY
07922*
BILIARY TRACT PERFORATION
04408* 09815
BILIARY TRACT POLYPS
09799*
BILIARY TRACT RADIOLOGY
SEE ALSO BILIARY DISEASE DIAGNOSIS
00333 00341 00626* 00776* 01203* 01247 01248 01254
01257 01258 01262 01645 02157 02158 02161 02164
02585 02586 02594 02976 03511 03512 03517 03839
03854 04421* 04707 06246 09826
BILIARY TRACT STRICTURE
00813 03510 06208* 06226 06234 06766* 09818 10787
BILIARY TRACT SURGERY
00629* 00763* 00764* 00772* 00774* 00784 00790 00802
00803 00804 01626* 01634 01641 01645 02163 02431*
02572* 02578* 02581 02586 02587 02599 02600 02763*
03348* 03490* 03492* 03493* 03494* 03495 03517 03519
03520 03542 03563 03593 03681* 04246 04413* 04426
04427 04431 04442 04443 04445 04449 04453 04722
05294* 05314 05318 06061* 06214* 06225 06244 06246
06693* 06972* 06973* 07108* 07113* 07124 07135 07139
07145 07975* 07992 07994 07996 08219* 08886* 08888*
08893 08897 08903 08905 08908 08919 08924 09796*
09797* 09799* 09812 09813 09817 09821 09831 09832
10211 10338* 10549 10649 10766* 10770* 10772* 10773*
10774 10781 10789 10792
BILIARY TRACT TRAUMA
00063* 07139 07143
BILIARY TRACT ULTRASTRUCTURE
06213*
BILIARY TRACT,AGE EFFECTS ON
04427 09000*
BILIARY TRACT,DISEASES ASSOCIATED WITH
00763* 01497* 01635 02178 06223* 06226 06950* 07113*
BILIARY TRACT,DRUG EFFECTS ON
00108 00342 00765* 00770* 00809 01075* 01145 01623*
01638 01959* 01963* 02157 02763* 02764* 02765* 02844*
02911* 03353* 03755* 04563* 04575* 04576* 04634* 04637*
05471* 05559 05574 05600 06379* 06396 06397 06483
07110* 07326* 07349* 09711*
BILIARY TRACT,DRUG TREATMENT OF
01638 03506 06074* 07105* 07133 08910
BILIARY TRACT,FOREIGN BODIES IN
00030 04715 05331 08886*
BILIARY TRACT,HORMONAL CONTROL OF
09138*
BILIARY TRACT,NERVOUS CONTROL OF
04572* 04575* 05402* 09014
BILIARY TRACT,TOXIC EFFECTS ON
01969* 06233 07326* 09816
BILIRUBIN
00794 01076* 01143 01200* 01238 01642 01652* 01966*
01967* 01975* 02446* 02447* 02448* 02474 02843* 02845*
02851* 02858* 02878 03830* 03837 04419* 04621* 04641*
04657 04658 04704* 04712 05264* 05307 05546* 05547*
05557* 05574 06103 06108 06181 06217* 06442* 06455*
06464* 06493 06532* 07485* 07822* 09101* 09109* 09122*
09131* 09204* 09206* 09214* 10071* 10097 10612 10617
BILIRUBIN METABOLISM
00226 00228 01066* 01067* 01068* 01069* 01491* 01492*
01965* 02478 02835* 02848* 03783 06103 07140 07338*
07481* 07830* 07835* 07853 08214* 08220* 08244* 08266
09126* 10061* 10073*
BIOCHEMICAL DIAGNOSIS OF JAUNDICE
10144
BIOCHEMICAL DIAGNOSIS OF LIVER DISEASES
10136*
BIOCHEMICAL DIAGNOSIS OF PANCREAS DISEASES
10518
BIOCHEMISTRY,BILIARY TRACT
01783* 01962* 10030*
BIOCHEMISTRY,GALLBLADDER
00761* 02713* 02838*
BIOCHEMISTRY,GASTROINTESTINAL
00016* 00242 00936 01178* 01190
BIOCHEMISTRY,LARGE INTESTINE
01428 01429 02713* 02895*
BIOCHEMISTRY,LIVER
00977 01079* 01083* 01115 01118 01561 01564 01601*
01620 01808* 01822 01824 01988 01989 02016 02019
02024 02028 02437* 02710* 02722 02870 02880 02882
03346* 03352* 04524 04529 05403* 05421 05570 06076*
06539* 07223 07235 07356 07359 07366 07395 07397
07398 07401 07404 07405 07408 07409 07410 07433
07436 07437 07438 07439 08102 08223* 08256 08272
10023* 10068* 10084 10628
BIOCHEMISTRY,PANCREAS
01064 01932* 02821* 05450* 07306* 08199* 08204* 10001*
BIOCHEMISTRY,SALIVARY GLAND
07797
BIOCHEMISTRY,SMALL INTESTINE
00046* 00629* 01055* 02334* 02608* 02734* 02735* 02893*
02894* 03619 06364 08284* 10099* 10339*
BIOCHEMISTRY,STOMACH
00170 00918 01036 01044 01045 02812 03621 09982*
09984* 09985* 09987* 09995*
BIOPOTENTIALS,GASTROINTESTINAL
07269* 07281* 07476* 08138* 08139* 08146 08148 09039*
09068* 09181* 09932* 09941 09944* 09947* 09950* 09955*
09957* 09964
BIOPSY IN CANCER DIAGNOSIS
09286 10250 10661
BIOPSY IN MALABSORPTION DIAGNOSIS
00263*
BIOPSY,DUODENUM
08323 10367
BIOPSY,ESOPHAGUS
04705* 05633*
BIOPSY,GASTROINTESTINAL
00343 00344 08052
BIOPSY,LARGE INTESTINE
02352* 02359* 02399* 07500 08706 09235 09556
BIOPSY,LIVER
00273* 00275* 00321 00760* 00764* 00835 01200* 01201*
01233 01234 01235 01249 01529 01530 01605* 01973*
02107* 02138 02139 02479 02569 02930 02971 02984
03434 03857 04717 05142* 05151 05252 05711 06223*
06538* 06984 06990 07020 07489* 07860 07912* 08317
08770 08821 09221 09655* 09663 09692 09708 09785
10136* 10140 10565* 10566* 10568* 10575* 10579* 10596
BIOPSY,RECTUM
00618 06839* 06856 06914* 07497 07725* 09471* 09584*
09594 10434*
BIOPSY,SMALL INTESTINE
00311 00312 00313 00547* 00550* 01393* 01399* 01402
01403 02050* 02319* 02322* 03825* 04046 04716 04926
04927 04977* 04990 05638* 05939 07500 07649* 07709*
07715 08633 09235 09455 09483* 10142 10336* 10374
10410* 10814* 10859*
BIOPSY,STOMACH
00290 00298 00484 01813 02111 02248 02957 03865
04705* 04716 04771* 04840 05669 05671 05676 05677
05783 05817 06676 06678 06699* 07599 08313 08416
08422 09293* 09295* 09347 09375 10250 10259 10316
BLEEDING
SEE ALSO ESOPHAGUS VARICES
02593 03045*
BLEEDING DIAGNOSIS
00604 02667 02914* 03381 03847 03848 03849 03878
05635* 05782 06842 07493* 08312 08320 09217 09668
10536* 10818*
BLEEDING DIAGNOSIS,ENDOSCOPY IN
06569* 09207* 10151 10835
BLEEDING DIAGNOSIS,RADIOLOGY IN
03848 07580* 08309 10151 10358
BLEEDING ETIOLOGY
00605 02121 02175 03878 05379 05748 06274 07581*
07629 08646* 08699
BLEEDING IN CHILDREN
05068 06279 07691 08929
BLEEDING PEPTIC ULCERS
00395* 00424 00433* 00470 00497 00498 01328* 01336*
04014 04868 04882 04895 05773* 05820* 05849 06730
06732 07581* 07645 08514 08934* 09386 09392 09417
10281* 10295 10306
BLEEDING TREATMENT
02215* 02665 02666 02667 04825 05021* 06568* 06569*
06612* 06841* 07171 07576 07580* 07597 08352 08360
08407 08646* 08830* 08959 09239* 09294* 09874 10175
10805* 10806*
BLEEDING,COOLING TREATMENT OF
01650* 09305 10268*
BLEEDING,GASTROINTESTINAL
00245 00355 00393* 00394* 00395* 00422 00429 00432*
00453* 00499 00602 00603 00604 00608* 00676 00682
00856 00857 00858 00859 01266 01267 01374 01480
01488* 01646* 01648* 01649* 01695 01706 01732 01735
02110 02174 02214* 02612* 02613* 02623 02624 02656
02665 02666 02667 02950 02975 03056* 03087 03135
03176 03210* 03318 03463* 03518 03549 03552 03553
03557 03589 03849 03878 03906* 03916 03921 03947
03971* 03989 04014 04014 04146 04253 04399 04462*
04484 04489 04489 04492 04792 04802 04807 04820
04825 04838 04857* 04868 04915* 04932 04944 04950
05021* 05039 05068 05279 05379 05388 05774* 05782
06079 06274 06279 06549 06569* 06599 06613* 06658
06748 06749 06841* 06890 06895 07138 . 07156* 07161
07171 07179 07187 07493* 07545 07579* 07580* 07581*
07597 07607 07613 07629 07637 07662 07691 07808*
08021* 08059 08072 08309 08312 08320 08366 08407
08421 08568 08646* 08664 08699 08715 08822 08929
08934* 08957 08959 08970 09207* 09217 09291* 09305
09307 09361 09363 09460 09587 09668 09839* 09862
09866 09874 10151 10161* 10251 10255 10260 10262

BLEEDING,GASTROINTESTINAL
CONTINUED
10268* 10475 10570* 10616 10667 10734* 10806* 10816*
10817* 10828 10830 10835 10848 10855
BLEEDING,LARGE INTESTINE
05962 05966 05970
BLEEDING,SURGICAL TREATMENT OF
07645 09361 09392 10179 10262 10268*
BLIND LOOP SYNDROME
03176 06755 07710* 08585
BLIND LOOP-INDUCED SECONDARY MALABSORPTION
07251* 07710* 08125* 08569 09845* 10114*
BLOCKING AGENTS,ADRENERGIC
00238* 00988* 01003 01869* 07266* 08143* 08179* 09049
09085* 09129* 09172* 09191* 09949*
BLOOD CHOLESTEROL
05881
BLOOD COAGULATION
00239* 00452* 03879 06728 06900 08934* 08942 10306
10479 10651
BLOOD COAGULATION IN CIRRHOSIS
08814 10729* 10754
BLOOD COAGULATION IN LIVER DISEASES
00270* 03478 04404 07951 08814 09745
BLOOD COAGULATION IN PANCREATIC DISEASES
09616*
BLOOD DISEASES
05363 06221*
BLOOD GROUP GENETIC RELATIONSHIPS
07155*
BLOOD GROUP SECRETOR STATUS
06359* 07477* 08517 09987*
BLOOD GROUPS
04348* 04777* 06230 06616*
BONE DISEASES
01408 01513 01684* 01774 02411 04071* 04770* 05766*
05794 07711* 07817 08339 08396 10393* 10561* 10597
BONE DISEASES,GASTRECTOMY-INDUCED
01683* 02268* 06611* 10117*
BONE DISEASES,MALABSORPTION-INDUCED
01656*
BRADYKININ
00112 01064 01341* 06389
BUDD-CHIARI SYNDROME
00751 02436* 02437* 02562* 02619* 03383 04257* 05145*
05156* 06066* 07002 08768* 08815 09666 09682 10570*

CAFFEINE
00485 05508*
CALCIFICATION
01688
CALCIUM
00050* 00971 00973 01603* 01895 01939* 02732* 02803
07276 07292* 07797 08742* 09600* 09964 09974* 10009*
CALCIUM ABSORPTION
00038* 00039* 00040* 00041* 00948* 00949* 00968 00969
00972 02066 02069 02737* 03489* 03547* 03627* 03628*
03649* 03650 03652 04530* 04533* 04544* 04553 04557
05448* 06611* 07253* 08632 09916* 09918* 09934* 10414*
10576*
CALCIUM METABOLISM
00084 02067 02068 02092 02892* 06611* 07583* 08537
08625 09918* 10117*
CALCULI,GASTROINTESTINAL
08530*
CALCULI,LIVER
10770* 10771* 10773*
CALCULI,PANCREAS
03310 06941 07138 07805 09619* 10508*
CANCER
09506 10180 10382
CANCER CHEMOTHERAPY
01730 02199 02376 02377 02508 03934 04154 04319
05371 05372 05656* 05949* 06668 06971* 07157 07793*
07829* 08819 09616*
CANCER DIAGNOSIS
00396 01435 01510 01520 01721 02116 02181 02344*
03545* 03850 03860 03910* 03933 03950 03951 03952
03962 04039 04058 04228 04266* 04702* 04708 04713
05008* 05036 05071 05202 05635* 05643* 05645* 05647*
05648* 05654* 05666 05674 05676 05678 05703 05704
05706 05722* 05897 05904 06063* 06085 06677 06719
06838* 06848 06927* 07023 07487* 07499 07513 08040
08310 08347 08370 08372 08397 08402 08453 08586
08705 08765* 08907 08969 09330 09352 09353 09359
09479* 09656* 09695 10205 10235 10370 10371 10448
10529
CANCER DIAGNOSIS,ANGIOGRAPHY IN
06557 07107* 07528 07604 08014* 08735 08777 09599*
09602 09613 10135* 10524
CANCER DIAGNOSIS,BIOPSY IN
09286 10250 10661
CANCER DIAGNOSIS,ENDOSCOPY IN
06668 10232
CANCER DIAGNOSIS,LYMPHOGRAPHY IN
10493
CANCER DIAGNOSIS,RADIOLOGY IN
06561 06687* 06909 06979 07604 07614 07823* 08014*
08434 08766* 09367 09674 09793*
CANCER EPIDEMIOLOGY
00361* 00389* 00762* 00778 01434 01486* 01722 02217*
02218* 02230 02344* 02345* 03211* 03221* 03387 03548*
03548* 03868* 03907* 04225 04772* 05007* 05008* 05012*
05014* 05015* 05017* 05722* 05755 05947* 05948* 06023*
06049 06666 06667 06834* 08440 08441 08442 08652*
08728* 09260 09273 09301* 09470 09703 09800* 09860
10162* 10192 10229 10486 10573* 10813*
CANCER ETIOLOGY
00361* 02217* 04121* 04295 05007* 05755 08578 08675
09572 10162* 10204*
CANCER IMMUNOLOGY
02989 04461* 09228 09298* 09561 09691 09695 09754
09851* 10224 10225 10226 10456 10555* 10573* 10834
CANCER IN CHILDREN
01519 05024 05905 06199
CANCER METABOLISM
07316* 07417 07793* 08786 08801 09664
CANCER PATHOLOGY
05334* 06764 06767 06871 07585* 08691 09300* 10615
CANCER SURGERY
04799 05050 05098* 05103 05994 06071* 06582 07548
07605 07753 07769 07787* 08423 08648* 08697 08729
08907 08909 08980 09258 09268 09300* 09308 09323
09516* 09518* 09528* 09606 10178 10189 10231 10427*
10437* 10439* 10473 10481
CANCER SURVIVAL RATES
02344* 02345* 02346* 02348* 03960 04772* 05012* 05014*
05769* 05947* 05948* 05950* 06071* 06971* 07733 07829*
08651* 08652* 09508* 09518* 10427*
CANCER TREATMENT
01729 02345* 02346* 04772* 05746 05954* 05997 06657
06660 07564 07829* 09344 09355 09558 09653* 09667
10190 10371
CANCER TREATMENT,RADIATION THERAPY IN
02199 02200 02201 02202 02378
CANCER TREATMENT,RADIOTHERAPY IN
01288 01289 01436 01439 01467 01519 01520 06933
07569 08363 09146 10191 10430* 10447 10816*
CANCER,ABDOMEN
08980
CANCER,AGE FACTORS IN
06616* 06621* 10204*
CANCER,ANUS
03238 04192 06847 07768
CANCER,APPENDIX
00579 08709 09542
CANCER,BILIARY TRACT
02602 02617* 03490* 03512 03534 03538 03541 03542
03850 05313 05651* 06233 06251 06252 08909 10772*
10813*
CANCER,CLINICAL STUDIES OF
06684*
CANCER,DISEASES ASSOCIATED WITH
06833* 07884 08933* 09573 10555*
CANCER,DUODENUM
03168 03169 03170 03172 04043 10369
CANCER,ESOPHAGUS
02956 02993* 02995* 02998* 02999* 03002* 03008* 03010
03020 03021 03028 03033 03040 03868* 03875 04726*
04736 04760 05489* 05654* 05722* 05724* 05742 05743
05746 05750 05755 05778 05935 06581 06582 06604
07553 07560 07564 08349 08363 08369 08370 08371
09273 09286 10162* 10178 10190 10191 10192
CANCER,GALLBLADDER
03507 03514 03516 03536 04414* 04428 04435 05287*
05300 05305 05317 05325 06209* 06240 07115 08907
08918 08923
CANCER,GASTROINTESTINAL
02611* 02646 02648 02662 02969 02989 03352* 03556
03559 03590 04461* 04493 04495 04496 05334* 05371
05372 05643* 06666 07157 08302 09860 10813*
CANCER,LARGE INTESTINE
02680 02687* 02945 03209* 03211* 03214* 03215* 03216*
03221* 03234 03236 03253 03259 03267 03271 03272
03273 03274 03283 03285* 03545* 03548* 03847 03928
03960 04110* 04116* 04117* 04118* 04118* 04119* 04120*
04121* 04127 04149 04151 04154 04155 04158 04159
04163 04165 04166 04168 04169 04172 04176 04179
04183 04184 04185 04186 04187 04190 04196 04199
04205* 04213 04216 05007* 05008* 05008* 05012* 05013*
05014* 05015* 05017* 05024 05034 05036 05037 05038
05046 05047 05059 05060 05064 05071 05077 05088
05643* 05947* 05948* 05954* 05955* 05973 05984 05985
05986 05994 05996 05997 06009 06023* 06834* 06867
06909 07726* 07745 07757 07770 08586 08652* 08665
08691 08692 09322 09532 09572 09579 09581 10458
10479 10486

CANCER,LIVER
02433* 02452 02455 02456 02458 02459 02460 02461
02462 02463 02464 02466 02467 02486 02883 02919*
03339* 03343* 03344* 03359 03366 03370 03374 03377
03379 03382 03387 03388 03391 03394 03473 03482
03840 04270* 04271* 04273* 04274* 04277* 04297 04301
04319 04321 04702* 04720 05148* 05157* 05163 05172
05174 05190 05193 05196 05202 05205 05257 05593
05648* 05654* 05656* 05696 05703 05704 05706 06063*
06066* 06071* 06073* 06080 06081 06084 06085 06086
06087 06097 06102 06112 06115 06118 06127 06128
06138 06199 06540* 06560 06763 06996 07005 07023
07157 07834* 07849 08651* 08875 09655* 09667 09695
09703 10226 10427* 10564* 10565* 10574* 10623 10626
10643 10661 10813*
CANCER,METABCLIC CHANGES IN
08800
CANCER,METASTATIC
00391* 00407 00583 00633 00634 00672 00679 01362
01416* 01425 01427 01438 01466 01509 01512 01513
01514 01520 01727 02149 02227 02292 02411 06540*
06558 06993 06996 07107* 07834* 08339 08396 08651*
08658* 08699 08875 08918 09298* 09340 09657* 09667
10217 10427* 10565* 10574* 10626
CANCER,PANCREAS
02617* 03305* 03312 03314 03316 03850 04219* 04225
04227 04228 04232 04233 04477 04689* 04697* 05097*
05098* 05101 05103 05114 05116 05124 05339* 05342
05343 05645* 06037 06040 06045 06049 06259* 06528*
06535* 06933 07798 08728* 09197* 09606 09630
CANCER,RECTUM
03233 03238 03239 03247 03248 03269 03270 03276
03278 03280 03281 04110* 04116* 04118* 04119* 04121*
04151 04152 04153 04155 04156 04169 04171 04183
04205* 05008* 05015* 05017* 05050 05948* 05950* 05954*
05996 06834* 06894 06903 07768 09529 09540 09558
09569 10478 10480 10481 10493
CANCEP,SMALL INTESTINE
02680 03158 03162 03163 03165 03168 03171 03305*
03850 03960 04039 04043 04058 04062 04083* 04914*
04928 04950 05885 05892 05894 05897 05904 05905
05910 08586
CANCER,STCMACH
00408 02434* 02646 02653 02956 02957 02960 02964
02968 02980 02983 03047* 03057* 03058* 03064 03075
03078 03079 03080 03082 03084 03086 03088 03090
03091 03094 03095 03096 03097 03099 03100 03101
03105 03108 03109 03111 03114 03115 03122* 03545*
03905* 03916 03918 03919 03920 03921 03927 03928
03929 03933 03934 03939 03948 03950 03951 03952
03954 03960 03962 04037 04133 04696* 04772* 04777*
04779* 04784 04793 04799 04801 04806 04807 04808
04813 04834 04839 04841 05654* 05666 05672 05673
05674 05676 05678 05742 05769* 05775 05776 05778
05789 05795 05798 05799 05800 05801 05804 05805
05806 05809 05811 05812 05814 05815 05844 06607*
06610* 06616* 06621* 06632 06647 06655 06657 06660
06661 06664 06667 06668 06674 06677 06684* 07589
07605 07612 07614 08369 08396 08399 08402 08423
08431 08437 08450 08452 08453 08454 08460 08469
08476 08819 09303* 09308 09318 09322 09323 09330
09352 09353 09354 09355 09357 09360 09547 10141
10178 10190 10192 10199* 10204* 10205 10227 10229
10231 10232 10252 10259
CARBOHYDRATE ABSORPTION
00956* 01661* 03640* 04556 04917* 05931 05936 05942
06812* 07249* 08134 08616* 08638 09027* 09030 09910*
09915* 09917* 09922* 09924* 09931* 09932* 09939*
CARBOHYDRATE DIGESTION
07451* 09487
CARBOHYDRATE METABOLISM
00233 01192 01287 03112 05560 05605* 06513* 06645
06664 06812* 07239* 07428 07452* 07457 07463 07842*
07880 07969 08108 08614* 09006 09424* 09915* 10731*
CARBOHYDRATE METABOLISM,LIVER
01134 02002 02003 02476 02849* 02857* 02943 04506*
04660 06439* 06466* 06481 06488 06503 07341* 07387
07826* 08252 08254 08265 08280 08282 08760* 09125*
09155 09233 10301
CARBOHYDRATE METABOLISM,SMALL INTESTINE
03190* 04019* 04080* 04091 04546*
CARBOHYDRATES
00082 01659* 01996 02073 06462* 07372
CARCINOGENESIS
00065* 01291 01304 07419 08040
CARCINOGENESIS,ESOPHAGUS
09287
CARCINOGENESIS,GASTROINTESTINAL
02969
CARCINOGENESIS,LARGE INTESTINE
03209* 03215* 04159 04162
CARCINOGENESIS,LIVER
02457 02461 02492* 02883 03379 03408* 03745* 04274*
04295 04300 04336 07897* 07898* 07906 10048*
CARCINOGENFSIS,SMALL INTESTINE
04050
CARCINOGENESIS,STOMACH
02225 06608* 07590
CARCINOGENS
01074* 07324* 07590 08212* 08222* 08238* 08243* 10037*
10162*
CARCINOID SYNDROME
SEE ALSO CARCINOIDS
SEE ALSO SEROTONIN
02646
CARCINCIDS
SEE ALSO CARCINOID SYNDROME
00009* 00517 01382 01386 01423 01424 01629 02233
06650 06763 06771 06863 06903 06996 07653* 07686
07689 07761 07804 08658* 08955 09292* 09542 10489
10530 10801
CAPCINOMA
10786
CARDIOSPASM
SEE ACHALASIA
CARDICVASCULAR SYSTEM
SEE ALSC PORTAL HYPERTENSION
00454* 00480 00603 00662* 01340* 01469* 01497* 01644
01650* 01692 01698 02077 02153 02177 02354* 02624
02626 02685 02905* 03572 04010 04288 06595 06779
06831 06939 07009 07053* 07475* 07842* 07961 08246*
08248* 08334* 08486* 08532 08543 08759* 08761* 08764*
08768* 08871 09190* 09238* 09603 09622 09641* 09676
09721 09724* 09741 09770 10181 10331* 10482 10584*
10600 10659 10729* 10756 10757
CARRIER STATE,SALMONELLOSIS
06300 09879
CATECHCLAMINE METABCLISM
03767 08956 09091* 09646*
CATHARTICS
SEE LAXATIVES
CECUM
SEE ALSC LARGE INTESTINE
00315 00580 00586 01381 02687* 02742* 04141 04179
04194 04199 04511 05010* 05026 05894 05973 05998
06001 06012 06741* 07731
CELIAC ARTERY
04310 05336* 05698 06271
CELIAC DISEASE
00262* 00547* 00548* 00549* 00550* 00554 01393* 01396*
01397* 01398* 01400* 01401 01402 01403 01680* 02338
02340 02341 02684 03186* 03187* 03195 03204 04083*
04090 04097 04098 04914* 04970* 04974* 04977* 04983
04989 04991 05001 05002 05641* 05922* 05925* 05926*
05929* 05930* 06260* 06814* 06822 06825 06830 07707*
07709* 07714* 07717 07721 08617* 08620* 08635 08636
08641 08933* 09485 09494 09496 09497 09498 09500
09501 09507 10336* 10404* 10408* 10411* 10417 10423
CELIAC PLEXUS
02617*
CELLULAR INFILTRATION
10336*
CENTRAL NERVOUS SYSTEM
SEE ALSO NEUROENDOCRINE CONTROL
00111 00154 00854 00881 00984* 01008 01345* 02032
06367* 07355 07537* 07626* 07809 07811 08092 08178*
08267 08753* 08763* 08998 09040 10124* 10639 10734*
CHEMICAL COMPOSITION,LARGE INTESTINE
02895*
CHEMICAL COMPOSITION,LIVER
01828 01829 06435* 06441* 06961* 07225 07362 07389
07826* 08224* 08267 09146 09151
CHEMICAL COMPOSITION,PANCREAS
07302*
CHEMICAL COMPOSITION,SALIVARY GLAND
00125
CHEMICAL COMPOSITION,STOMACH
06618* 09077*
CHEMICAL TOXINS
SEE ALSO TOXIC EFFECTS ON BILIARY TRACT
SEE ALSO TOXIC EFFECTS ON ESOPHAGUS
SEE ALSO TOXIC EFFECTS ON GASTROINTESTINAL TRACT
SEE ALSO TOXIC EFFECTS ON LARGE INTESTINE
SEE ALSO TOXIC EFFECTS ON LIVER
SEE ALSO TOXIC EFFECTS ON PANCREAS
SEE ALSO TOXIC EFFECTS ON RECTUM
SEE ALSO TOXIC EFFECTS ON SMALL INTESTINE
SEE ALSO TOXIC EFFECTS ON STOMACH
00191* 00197*
CHEMCTHERAPY,CANCER
01730 02199 02376 02377 02508 03934 04154 04319
05371 05372 05656* 05949* 06668 06971* 07157 07793*
07829* 08819 09616*
CHILDREN,ABCOMEN IN
01674* 01723 02679 04485 06267 07721 08043 08326
08950 08951 08982 09875
CHILDREN,AECCMEN TRAUMA IN
06790 07692 07895* 08830* 08834

CHILDREN,ABSORPTION IN
00049* 00056* 06813* 09915*
CHILDREN,ACUTE ABDOMEN IN
07695 09469
CHILDREN,ANUS IN
06892 06901 08647*
CHILDREN,APPENDICITIS IN
04130 04164 04189 05011* 05028 05689 05959* 06004
06900 07203 07495 09567
CHILDREN,APPENDIX IN
02366
CHILDREN,BILIARY DISEASE IN
04421* 07106* 07488*
CHILDREN,BILIARY TRACT IN
00795 05330 06214* 06216* 06250 10662 10774 10803
CHILDREN,BLEEDING IN
05068 06279 07691 08929
CHILDREN,CANCER IN
01519 05024 05905 06199
CHILDREN,CHOLECYSTITIS IN
03498 08989 09830
CHILDREN,CHOLELITHIASIS IN
03525 04417* 06230 09828
CHILDREN,CIRRHOSIS IN
03466 04389* 04397 06113 06199 07959* 08783 08876
08877 09775 09779 10732* 10740
CHILDREN,DIARRHEA IN
SEE ALSO CELIAC DISEASE
00827* 00828* 00878 01659* 01660* 01661* 01757 01771
02326* 05354 06256* 06258* 06262* 06280 06778 06812*
07150* 07713* 08626 08943 08944 09494 09864
CHILDREN,DIGESTION IN
08989
CHILDREN,DUODENUM IN
00502* 08291* 08323 08404 08545 09846*
CHILDREN,DYSENTERY IN
05349 05350
CHILDREN,ENTERITIS IN
05080 05084 06746* 06785 06803 06821 08525* 08583
08585 08608 09871
CHILDREN,ENTEROCOLITIS IN
00886 03228* 05093 07154* 08962 09441
CHILDREN,ESOPHAGUS IN
00370 00371 00375 00378 01281 01294 01874 01875
02188* 02206 02977 02996* 03022 04754 04762 04765
04768 05723* 05731 05734 05738 05739 05752 06380
06573 06600 07541* 07542* 07556 08332* 08337 09237*
09255 09270 09280 09282 10163* 10164*
CHILDREN,GALLBLADDER IN
04417* 06219* 08921
CHILDREN,GASTROENTERITIS IN
04483 05352 06261* 08017* 08018* 08019*
CHILDREN,GASTROINTESTINAL DISEASES IN
00845 01657* 02611* 02649 02651 02654 02663 02672
02673 02676 03204 03287* 03578 03592 05384 06278
07160
CHILDREN,GASTROINTESTINAL TRACT IN
00937 01224 01265 01404 01697 01872* 01873* 04490
07175 07527 08030 08324 08325 08949 09047 09461
09862 10198* 10340* 10854
CHILDREN,HEPATITIS IN
03427* 03448* 03466 05259 05260 07051* 08780 08783
08832 08835 08854 09757 09779
CHILDREN,HERNIA IN
04764
CHILDREN,JAUNDICE IN
05315 06137 07021 10559*
CHILDREN,LARGE INTESTINE IN
00574* 02357* 02359* 03223* 03226* 03227* 03228* 03266
04143 05024 05042 05081 05946* 05953* 05978 06000
06544 07191 07778 08672 08714 09510* 10115* 10464
CHILDREN,LIVER DISEASES IN
03339* 03341* 03345* 03376 03382 04272* 05141* 05152*
05156* 05197 05199 05206 06121 06958* 06960* 06967*
06968*
CHILDREN,LIVER IN
00005* 00671 00702* 01519 01542 01551 01553 01572
02139 04660 06085 06095 06102 06103 06106 06160*
07849 07874 07876 07878 07882 08784 08785 08791
08810 09663 09682 09708 09719 10554* 10567* 10585*
CHILDREN,MALABSORPTION IN
00261* 00263* 00553* 01661* 02102* 02103* 02328* 02343
03201 04078* 04087 04097 04098 04099 04977* 04980
04983 04986 04989 04998 05000 05004 05925* 05928*
05938 05939 06044 06816* 06822 06827 07714* 07715
07718 08626 08629 08634 09493 10257 10425
CHILDREN,PANCREAS IN
00625* 00626* 00628* 00635 00636 00648 02417 02418
02420 03316 04223 04477 05112 06041 08785 10154
CHILDREN,PANCREATITIS IN
01471* 03322* 04245
CHILDREN,PARASITIC DISEASES IN
01784* 01787 06095 06296 07203 08067 08989 08990*
08992 08998
CHILDREN,PEPTIC ULCERS IN
02281 03136 04848* 04908 05850 09390
CHILDREN,PERITONITIS IN
05689 10384
CHILDREN,PORTAL HYPERTENSION IN
04286 06105 06109 06117 06126 07010 10169 10554*
10632 10640
CHILDREN,RECTUM IN
05068 05968 05996 06856 06883 06886 06902 07741
09557 10487
CHILDREN,SALIVARY GLANDS IN
10815*
CHILDREN,SALMONELLOSIS IN
05349
CHILDREN,SHIGELLOSIS IN
08943
CHILDREN,SMALL INTESTINE IN
00311 00312 00313 01368* 01375 01376 01405 02305
03191* 03228* 03662 03825* 04031 04063 04065 04926
04927 04930 04965 05631 05680 05867 05886 05903
05905 05907 05909 05919 06544 06769 06820 07191
07666 08615* 08633 09454 10115* 10343* 10360 10368
10402*
CHILDREN,STOMACH IN
01303 02240 03051* 03053* 03901* 04611 04613 04811
05810 06628 07588* 08291* 08394* 08404 08471 09082
09253 09302* 09310 09326 09346 09846* 10213
CHILDREN,SURGERY IN
00530 08307
CHILDREN,ULCERATIVE COLITIS IN
01461 04207* 05004 05088 05090 06022* 06027 06919*
08721*
CHILDREN,VIRAL HEPATITIS IN
00706* 00728 01583 02551 03446 04344* 04351 04353
04364 06162* 07075 07919* 07932 08846* 09751 09752
09756 09764 09765 09767 09775
CHILDREN,VOMITING IN
06590
CHLORIDE ABSORPTION
03632* 06817*
CHLORIDE METABOLISM
07150* 09856 09865
CHOLANGIOGRAPHY
00331 00332 00334 00335 00339 00341 01251 01252
01254 01255 01259 01260 02155 02156 02158 02159
02160 02164 03511 03512 03517 03526 03858 04446
04722 05297* 05302 05650* 06067* 06551 06553 06554
07119 07120 07122 07132 07502 07503 07510 07524
07985 07987 08007 08303 08305 08329 08766* 08913
09207* 09221 09793* 09797* 09798* 10152 10155 10669
10759* 10779 10789 10791 10802
CHOLANGITIS
00805 06973* 07116 08896 10545 10558* 10764* 10768*
10783 10794
CHOLECYSTECTOMY
SEE ALSO GALLBLADDER SURGERY
02577* 02579* 02585 03492* 03494* 03497* 04411* 04413*
04417* 04434 04437 04450 05271* 05326 07110* 07145
07980* 07988 08010 08921 08928 09122* 09810 09819
10760* 10761* 10778
CHOLECYSTECTOMY COMPLICATIONS
03530 06235 06238
CHOLECYSTITIS
00807 00808 00809 01643 01644 01645 02580* 02584
02594 03500 03503 03508 03513 03521 03537 03544
04289 04410* 04411* 04417* 04428 04432 04433 04435
04438 04440 04455 05287* 05296* 05305 05319 05320
05322 06217* 07130 07974* 07976* 07984* 07999 08891
08895 08911 09820 09827 09836 09837 10545 10758*
10768* 10775 10780 10797 10799
CHOLECYSTITIS DIAGNOSIS
03497* 06222* 07134 07991 07998 08915 08916 10776
10802
CHOLECYSTITIS ETIOLOGY
04441 06222* 07976* 07977*
CHOLECYSTITIS IN CHILDREN
03498 08989 09830
CHOLECYSTITIS TREATMENT
02577* 04873 06255 07974* 07997 08003 08891 08899
08916 10785
CHOLECYSTOGRAPHY
02165 02166 02167 02170 02171 03841 04410* 04416*
07103* 07991 07998 08000 08007 08900 08913 09794*
09806* 10153 10758* 10795 10799 10800
CHOLECYSTOKININ
01076* 01927 01958* 02762* 02787* 03735* 04621* 04623*
05530* 05533* 05653* 06378* 06406* 07281* 07473* 07503
08904 09066* 09073* 09089* 09806* 09944* 09968* 09983*
10007*
CHOLEDOCHAL CYST
05330
CHOLEDOCHOLITHIASIS
01624* 02572* 03502 03504 03524 04410* 05310 07105*
07975* 07981* 07984* 07989 08766* 08893 09794* 09796*
09834 10761* 10763* 10766* 10771*

CHOLELITHIASIS
00761* 00777* 00782 00788 00796 00810 00811 00812
00813 00814 00815 00816 00817 00818 00819 00823
01621* 01622* 01635 01637 02159 02162 02571* 02573*
02574* 02575* 02590 02592 02838* 03491* 03495* 03515
03531 03535 04315 04414* 04435 04453 05154* 05289*
05294* 05296* 05299 05311 05329 05331 05900 05902
06064* 06211* 06217* 06220* 06237 06239 06242 06950*
07109* 07111* 07137 07144 07343* 07811 07971* 07982*
07985 07990 08005 08885* 09824 09835 10228 10369
10558* [illegible]* 10758* 10760* 10762* 10767* 10768* 10770*
10790 10793
CHOLELITHIASIS COMPLICATIONS
03518 03519 08539 08894 08922 09803*
CHOLELITHIASIS DIAGNOSIS
03492* 07118 07981* 07984* 10788
CHOLELITHIASIS EPIDEMIOLOGY
02570* 04409* 06221* 07112* 07146 09835 10760* 10765*
10773*
CHOLELITHIASIS ETIOLOGY
00089* 00769* 01073* 02570* 02573* 02574* 04406* 04409*
04412* 04415* 04418* 04423* 05293* 05295* 05321 06215*
06236 07112* 07977* 08931 09795* 09804* 10676* 10765*
CHOLELITHIASIS IN CHILDREN
03525 04417* 06230 09828
CHOLELITHIASIS PATHOLOGY
04447 08917 10788
CHOLELITHIASIS SURGERY
07980* 07989 08887*
CHOLELITHIASIS TREATMENT
03492* 03502 03532 03533 04406* 04447 06208* 06212*
10762* 10769*
CHOLELITHIASIS,AGE FACTORS IN
00785 00786 02570* 07990
CHOLELITHIASIS,DISEASES ASSOCIATED WITH
00541* 06221* 09800* 10766*
CHOLERA
00060* 00061* 01658* 01771 01772 01849 02291* 03903*
04464 04672* 05348 05863* 06273 06506* 07152* 07188
07189 07192 07193 08031 08558 09424* 09849* 10768*
10811* 10845
CHOLERETIC AGENTS
00194* 00217 00814 00863 01188 01638 01960* 02635
04637* 04642* 06324 06450* 10034*
CHOLESTASIS
00658* 00688 00767* 00791 00792 00793 01141 01204*
01533 01623* 01655* 01963* 01967* 01968* 01969* 02154
02576* 02582 02591 03346* 03353* 03372 03386 03752*
04407* 04424 05113 05288* 05304 05315 06074* 06442*
06998 07000 07017 07121 07315* 07891* 08009 08824*
08884* 08926 09110* 09652* 09658* 09679 09711* 10036*
10534* 10559* 10571* 10584* 10655
CHOLESTEROL
SEE ALSO HORMONAL CONTROL OF GALLBLADDER
SEE ALSO LIVER METABOLISM
00769* 01086* 01129 01131 01621* 02575* 03491* 03495*
03639* 03643* 03757* 03766 04415* 04418* 04653 04664
05293* 05295* 05322 05588 05592 05881 06211* 06220*
07144 10035* 10767*
CHOLESTEROL ABSORPTION
00942* 00957* 01955* 03642* 04547* 04548* 05288* 09024*
CHOLESTEROL METABOLISM
01955* 02050* 02571* 02574* 02896* 03497* 04412* 06423*
07788* 07973* 09489 10086 10129 10130
CHOLESTEROL METABOLISM,LIVER
00708* 01072* 02033 02425* 02836* 02849* 04278* 04638*
04639* 05157* 05288* 05548* 05550* 06064* 06437* 06470
06475 07311* 07342* 07351* 07430 08240* 08885* 09120*
09143 09148 09912* 10020* 10045* 10060* 10093
CHOLESTEROL SYNTHESIS
02050* 04406* 04679 05157* 05548* 07351* 07375 07430
CHOLESTEROL,BLOOD
05881
CHOLESTEROL,SERUM
02578* 02745* 03421* 03426* 03642* 04263* 04967* 07009
07465 07531 07711* 07973* 09801* 10050*
CHOLINERGIC AGENTS
01017* 01025* 01033* 01059* 01335* 01867* 01903* 07264*
07265* 07267* 07275 07276 09949* 10004* 10270*
CHRONIC GASTRITIS
04796 04815 07598
CHRONIC HEPATITIS
00713 00720 00726 00729* 00730* 00731* 00732 00733
00734 00735 00736 01493* 01577* 01597* 01598 01599
02442* 02554* 02555 02556 03449 03450 03457* 03487
04309 04376 04377* 04378* 04379* 04380* 04382 04383
04384 04385 04394* 04698* 05146* 05154* 05225* 05226*
05254* 05255* 05256* 05257 05258 05259 05260 05261
06141 07054* 07081 07084* 07085 07086 07087 07894*
07916* 07948* 07950 07951 08814 08868 08869 08870
08977 09463 09636* 09758 09776* 09778 09779 09894*
10696* 10714* 10716* 10717* 10718 10719 10720 10721
10723 10724
CHRONIC PANCREATITIS
00630* 00647 00648 00650 02421* 02423 03327* 03329
03330 03331 03333 04237* 04247 04248 04251 04254
04624* 04690* 04701* 05097* 05119* 05123* 05124 05125
05127 05135 05136 05646* 06035* 06051* 06053 06948*
06954 06955 07033 07034 07303* 07808* 07810 07815
08749 08750 08751 09615* 09619* 09626 09628 09629
09630 10508* 10541 10542
CHYMOTRYPSIN
01936* 03562
CIRCADIAN RHYTHM
00018* 00235 01090* 01095 01807* 06484 07380 08151*
08283 08995 09929* 09954* 10017*
CIRCULATION IN CIRRHOSIS
07956* 07966 09638* 09781* 09763
CIRCULATION IN HEPATITIS
07036 09771
CIRCULATION IN JAUNDICE
06964*
CIRCULATION IN PANCREATITIS
09628 10543
CIRCULATION IN PEPTIC ULCERS
09409
CIRCULATION IN PORTAL HYPERTENSION
02450*
CIRCULATION STUDY TECHNIQUES,GASTROINTESTINAL
01171* 01183
CIRCULATION,ABDOMEN
00759 01678* 01692 03461* 05373
CIRCULATION,BILIARY TRACT
02911* 03511 04420* 04421* 07126 09154 09192
CIRCULATION,ESOPHAGUS
00281 00901* 03606* 05426 05663 06522 06585
CIRCULATION,GALLBLADDER
01831 02728 06377* 10118*
CIRCULATION,GASTROINTESTINAL
00244 00251 00540* 00834 00937 01169* 01170* 01182
01694 01733 01819 02080* 02083* 02085* 02093 02104*
02622 02685 02690 02905* 02907* 02975 03555 03816*
03817* 03820 03821 04462* 04471 04686* 04915* 05386
06453* 08947
CIRCULATION,HORMONAL CONTROL OF
01175*
CIRCULATION,LARGE INTESTINE
00116 00240* 01183 03822 04177 06353* 06517* 07654*
07659 07765 09037* 09041 09190*
CIRCULATION,LIVER
00205* 00206* 00214 00220 00238* 00239* 00243 00249
00250 00324 00669 00681 00682 00683 00684 00686
00751 00772* 00910* 00930 01171* 01174* 01180 01181
01242 01243 01485* 01492* 01961* 01970* 02082* 02090
02091 02105* 02429* 02436* 02437* 02562* 02853* 02915*
02951 02952 02953 02955 02962 02985 02986 03357
03367 03368 03369 03376 03380 03383 03395 03468
03474 03477 03596* 03756* 03762* 03817* 03819 03823
03824 03926 04268* 04278* 04303 04306 04308 04310
04320 04388* 04393* 04396 04398 04420* 04554 04642*
04649* 04687 04688 05144* 05145* 05148* 05149* 05156*
05161 05163 05199 05264* 05267* 05270* 05273* 05274
05324 05327 05576 05622* 05629 05649* 05697 05698
06026 06062* 06065* 06066* 06075* 06077 06096 06101
06187* 06319 06336 06340 06516* 06518* 06520 06959*
06982 06991 07043* 07143 07329* 07820* 07850 07852
07890 07960 08235* 08759* 08829* 09001* 09011 09119*
09144 09187* 09193 09194 09196 09647* 09653* 09701
09702 09907 10018* 10026* 10678
CIRCULATION,LYMPH
03614 04235* 04395* 07726* 08016* 09618* 09701 09826
09933*
CIRCULATION,MESENTERY
02176 02318 04471 04472 06521 06765 07525 08527*
09172* 09180* 09191* 09880 10331*
CIRCULATION,PANCREAS
00252 02908* 02918* 03313 04310 05117 05127 05133
06048 06427* 07035 09002* 09195 10010* 10511*
CIRCULATION,PORTAL
00207* 00243 00246 00247 00248 00326 00359 00855
01172* 01173* 01608* 02084* 02864* 05152* 05622* 06075*
06203 06453* 06518* 06529* 07022 07244* 07839* 07868
07904 08087* 08100 08762* 08764* 08797 08970 09124*
09909 10502* 10552* 10600
CIRCULATION,SMALL INTESTINE
00240* 00529 01801* 04028 04046 04465 04549* 04550*
04912* 04929 04940 04945 04955 04966* 05446* 05470*
05624* 05625* 05628* 05889 05907 06517* 07227 07643
07654* 07659 08123* 09037* 09041 09185* 09190* 09191*
09923* 09928*
CIRCULATION,STOMACH
01175* 01179 01908* 01918* 01923 02088 02262* 03702*
03818* 04818 04834 05426 05626* 05632 05820* 06404*
06519* 08104 09008 09074* 09075* 09973* 10207
CIRCULATION,TOXIC EFFECTS ON
02085*

CIRRHOSIS
SEE ALSO ASCITES
SEE ALSO ESOPHAGUS VARICES
SEE ALSO LIVER COMA
SEE ALSO PORTAL HYPERTENSION
00740* 00743 00744 00746 00748 00749 00750 00752
00757 00765* 01250 01601* 01602* 01603* 01604* 01605*
01608* 01613 01615 01616 02441* 02442* 02494* 02514*
02560* 02569 02615* 02915* 03387 03400 03408* 03447*
03455* 03457* 03459* 03460* 03461* 03465 03468 03473
03475 03476 03478 03479 03482 03484 03485 03486
03487 03546* 04069* 04270* 04338 04385 04396 04398
04403 05146* 05193 05262* 05264* 05265* 05266* 05276
05284 07089* 07090* 07091* 07093* 07094* 07095 07098
07706* 07820* 07827* 07832* 07854* 07954* 07956* 07965
07967 08065* 08865* 08872 08874 08875 08882 08977
08996 09187* 09201* 09463 09693 09786 09791 10560*
10564* 10583* 10717* 10727* 10738* 10748 10749 10751
CIRRHOSIS COMPLICATIONS
00696* 01609* 02447* 02450* 02561* 03463* 03464* 03481
04399 04402 05151* 05154* 05279 06187* 06190* 06197
06199 06202 07955* 08879 10562* 10580* 10726* 10728*
10733* 10743 10755
CIRRHOSIS DIAGNOSIS
00271* 02105* 02152 02153 02914* 03462* 03470 03857
04386* 04397 04698* 04703* 05148* 05263* 05280 05282
06207 06979 06981 07484* 08765* 08864* 09656* 09670
09674 09785 10153 10563*
CIRRHOSIS EPIDEMIOLOGY
00737* 01611 02496 02565 02566 03387 03458* 05268*
06188* 06189* 07962 09649* 09786 10737*
CIRRHOSIS ETIOLOGY
01611 02565 02566 04394* 05268* 05275 06192* 06194*
07962 08876 08880 10048* 10732*
CIRRHOSIS IMMUNOLOGY
01612 04390* 04392* 05280 06192* 07508 08783 08816
08877 08883 09688 09777* 10569* 10584* 10587* 10685*
10687* 10688* 10715* 10719 10735* 10736* 10747
CIRRHOSIS IN CHILDREN
03466 04389* 04397 06113 06199 07959* 08783 08876
08877 09775 09779 10732* 10740
CIRRHOSIS PATHOLOGY
03452* 04387* 04388* 04391* 04393* 04395* 05267* 05268*
05269* 05272* 06188* 06191* 06192* 06193* 06194* 06206
07957* 07959* 09636* 09662 10074* 10742 10750
CIRRHOSIS TREATMENT
02493* 02558* 02559* 02561* 03470 03474 04347* 05141*
05274 05277 05281 05285 06188* 06190* 06202 06205
06207 07088* 07097 07960 07968 08820 08879 08881
09780* 10569* 10715* 10725* 10730* 10734* 10752 10755
10756
CIRRHOSIS,ALCOHOL IN
00737* 00745 01600* 01604* 01610* 01617 01618 01765
02563* 02565 02567 02568 04398 04403 06189* 07090*
07099 07827* 10426* 10513* 10584* 10737*
CIRRHOSIS,ASCITES IN
00757 01487* 02561* 03464* 05270* 05273* 07099 07955*
08864* 08866* 09780* 09792 10733* 10752
CIRRHOSIS,BILIARY
02440* 02557* 05271* 05300 05650* 07953* 09711* 09786
09790 10576* 10736* 10739*
CIRRHOSIS,BLOOD COAGULATION IN
08814 10729* 10754
CIRRHOSIS,CIRCULATION IN
07956* 07966 09638* 09781* 09783
CIRRHOSIS,DISEASES ASSOCIATED WITH
00674 00709* 00710* 00711* 01600* 01607* 01608* 01610*
01799 02312 02557* 06193* 06195* 07101 07102 08871
08878 09787 10722 10739* 10740
CIRRHOSIS,ELECTROLYTE METABOLISM IN
07092* 07968
CIRRHOSIS,EXPERIMENTAL
00747 01093* 01614 04391* 06143* 06192* 07038* 07898*
08235* 09168 10074*
CIRRHOSIS,METABOLIC CHANGES IN
01560* 05284 07092* 07955* 07964 07969 08865* 08866*
08867* 08872 09122* 09782* 09784 09788 10026* 10575*
10731* 10732* 10733* 10741 10744 10746 10748 10753
10757
CIRRHOSIS,POSTNECROTIC
08873
CIRRHOSIS,WATER METABOLISM IN
07092* 07968
COBALT
01833* 05855
COBALT ABSORPTION
01834* 07248*
COLITIS
SEE ALSO ENTERITIS
SEE ALSO ENTEROCOLITIS
SEE ALSO GASTROENTERITIS
SEE ALSO REGIONAL ENTERITIS
00594 00595 01432 02354* 03241 03242 03243 03250
03260 03261 04107* 04108* 04123* 04124* 05035 05057
06835* 06875 06893 07672 07773 09523* 09536 09554
09580 10387* 10454 10462 10463 10491 10492 10495
COLITIS COMPLICATIONS,ULCERATIVE
00612* 04214 05139* 06023* 06024* 06026 06029
COLITIS DIAGNOSIS
09520* 10448
COLITIS DIAGNOSIS,RADIOLOGY IN ULCERATIVE
08722*
COLITIS DIAGNOSIS,ULCERATIVE
00618 00624 01231 01460 02133 02399* 03303 04204*
05086 06923 08724 09584* 09589 10434* 10500*
COLITIS EPIDEMIOLOGY,ULCERATIVE
02404* 04218 06018* 06019* 07789* 08655* 10499* 10503*
COLITIS ETIOLOGY
04161
COLITIS ETIOLOGY,ULCERATIVE
00610* 00623 02405* 04203* 04218 05085* 06007 09586*
09598
COLITIS HISTOLOGY,ULCERATIVE
00608*
COLITIS IMMUNOLOGY,ULCERATIVE
00609* 00615 00621 00622 00623 05085* 06918* 10392*
10505 10587*
COLITIS IN CHILDREN,ULCERATIVE
01461 04207* 05004 05088 05090 06022* 06027 06919*
08721*
COLITIS PATHOLOGY
05023*
COLITIS PATHOLOGY,ULCERATIVE
01456* 01459 01461 04203* 04218 06022* 06025 06028
09594
COLITIS SURGERY
04161
COLITIS SURGERY,ULCERATIVE
00611* 00619 04208* 05863* 05975 06022* 07792 08648*
08655* 08726 09595 09597 10345* 10439* 10502* 10504*
COLITIS TREATMENT
03240 05053
COLITIS TREATMENT,ULCERATIVE
00611* 00616 02655 04205* 04206* 04209* 05086 05091
06021* 06025 06030 06917* 08721* 10502*
COLITIS,CLINICAL STUDIES OF ULCERATIVE
00611* 07791
COLITIS,DISEASES ASSOCIATED WITH ULCERATIVE
00611* 00612* 00613* 00620 01462 01647* 02397* 02398*
02399* 02400* 02403* 06023* 06024* 08643* 08721* 08725
09586* 09590
COLITIS,DRUG TREATMENT OF ULCERATIVE
02396* 02404* 06915* 06919* 06924 09596
COLITIS,GRANULOMATOUS
SEE ALSO CROHNS DISEASE OF COLON
03286*
COLITIS,IMMUNOLOGY IN ULCERATIVE
06916*
COLITIS,ULCERATIVE
00540* 00589 00614 00617 01457* 01458* 02397* 02401*
02402* 02406 02407 02597 02622 03285* 03286* 03287*
03290* 03291 03291 03291* 03292 03293 03294 03295
03296 03298 03300 03301 03302 03570 04124* 04213
04215 04216 04217 04269* 05087 05089 06801* 06891
06914* 06915* 06916* 06917* 06918* 06920* 06921 06922
07781 07787* 08642 08643* 08655* 08701 08725 09472*
09585* 09587 09588 09591 09592 09593 09925* 10291
10336* 10435* 10499* 10501* 10506 10507
COLLAGEN
01417* 01418* 01560* 01615 03613
COLLAGEN DISEASES
07907* 08021* 08617*
COLON
SEE ALSO LARGE INTESTINE
02698 03206* 03208* 03210* 03211* 03212* 03213* 03221*
03232 03234 03235 03241 03250 03251 03252 03253
03254 03255 03256 03258 03259 03260 03263 03265
03266 03273 03274 03275 03282 03285* 03608* 03620
03672* 03678* 03679* 03680* 03804* 03834* 03847 03928
04040 04064 04103* 04109* 04110* 04113* 04115* 04117*
04125* 04127 04128 04136 04138 04144 04146 04147
04149 04154 04155 04157 04160 04162 04165 04167
04169 04170 04172 04174 04175 04176 04178 04184
04185 04186 04187 04191 04196 04200 04201 04213
04216 04543* 04580* 04585 05014* 05017* 05021* 05029
05030 05031 05032 05033 05038 05042 05045 05048
05055 05062 05064 05065 05066 05076 05078 05415*
05416* 05475 05476 05477 05478 05612 05613 05684
05685 05887 05946* 05953* 05955* 05956* 05960 05961
05963 05964 05967 05969 05971 05984 05985 05987
05992 05993 06009 06010 06016 06186* 07770 10490
COLON DIAGNOSIS
05643* 05644*
COLON FISTULAS
09477
COLON,CROHNS DISEASE OF
00539* 00540* 00592 01676* 02099* 02128 02353* 03192*
03229* 03245 03292 03293 04122* 04209* 04214 05016*
05018* 05057 05976 05980 06013 06020* 06832* 06918*
07672 07737 07789* 07790* 08696 08720 08722* 08723*
09477 09521* 09546 09589 10393* 10449 10450 10467
10499* 10500*

COLON,IRRITABLE
00571* 00624 00864 02668 03244 05006* 07777 08557
09536 10431* 10462 10474 10498
COLOSTOMY
00537 01441 01676* 02132 02355* 02380 04103* 04105*
04112* 04158 05018* 05944* 05951* 06843 06849 06881
07194 07728* 09531 10438* 10442* 10496
COMA,HEPATIC
SEE ALSO LIVER COMA
02434* 02480
COMA,LIVER
01506 01556* 02434* 03342* 03362 03363 03385 03486
04272* 04276* 05147* 05151* 05169 05170 05171 05192
05227* 05237 06060* 06077 06088 06121 06129 06160*
06183 06186* 06969* 06999 07840* 08250* 08799 09640*
09646* 09665 09746 10426* 10582* 10588* 10589* 10591*
10628 10652 10716*
COMMON BILE DUCT
SEE ALSO BILIARY TRACT
00770* 00772* 00806 00823 02446* 02588 02600 02601
03490* 03493* 03496* 03502 03525 03528 03539 03540
03646* 03681* 03930 04408* 04413* 04425 04442 04448
04563* 04571* 04572* 05289* 05290* 05301 05302 05312
05471* 06061* 06214* 06225 06228 06232 06237 06242
06249 06254 07110* 07142 07503 09138* 09189* 10067*
10759*
COMPUTERS IN DIAGNOSIS
02970 03220* 03833* 04709 07513 08295* 08318 08321
09226 10832
CONGENITAL ANOMALIES
00532 00586 00662* 00773* 00774* 00806 00823 00832
00833 01302 01368* 01420* 01449 01450 01451 01500
01697 01698 02179 02204 02285* 02305 02432* 02487
02581 02588 02598 02629 02673 03160 04113* 04260*
04916* 04961 04981 05179 05327 05360 05765* 05780
05803 05807 05816 05867 06005 06044 06047 06093
06227 06228 06269 06590 06776 06817* 06819* 06839*
06874 06926* 06962* 06975* 07125 07136 07539* 07795*
07826* 07837* 07844* 07862 07868 07897* 07960 08342
08356 08382 08401 08429 09455 08472 08958 09264
09267 09269 09281 09343 09345 09393 09435 09456
09492 09807* 09825 10158* 10197* 10368 10422 10477
10600 10618 10745 10850
CONSTIPATION
00357 00879 00880 01749 01750 01751 03227* 04113*
04132 04467 05989 05990 05995 06003 07183 08061
08946 10443* 10497
CONTRACEPTIVE DRUGS IN LIVER INJURIES
01565 01963* 02436* 02495* 02498 04661 07050* 07892*
08824* 09675 09710*
CONTRAST MEDIA
02920* 02929 02944 02947 02963 02974 02979 03647*
03834* 03846 03853 03854 03863 04105* 04509* 04707
05292* 05636* 05660* 05688 05982 06036* 06054 06067*
07205* 08011* 08264 08331 08900 09136* 09218 09229
09240* 10577*
COOLING TREATMENT OF BLEEDING
01650* 09305 10268*
COPPER
01673*
COPPER ABSORPTION
07039*
COPPER EXCRETION
07025 09634*
COPPER METABOLISM
02440* 03749* 06113 06162* 06957* 07461 07889 08159
COPPER METABOLISM,LIVER
00934 01199* 04262* 05178 06113 06194* 07025 07039*
09012 09790
CORTICOSTEROIDS
00010* 00122 00539* 00688 00765* 01023* 01024* 01040
01042 01046 01085* 01135 01393* 01587 01781 02003
02258* 02273 02320* 02862* 04554 05256* 05976 06314*
06451* 06458* 06462* 06801* 07097 07298 07377 07642
08021* 08026 08114* 08237* 08727* 08855 09081 09145
09152 09170* 09354 09473 09583* 09596 09930* 10025*
10029* 10033* 10090 10104* 10345* 10387* 10510* 10576*
10673* 10744 10852
CROHNS DISEASE
00539* 00540* 00542 00543 00617 01196* 01676* 01677*
02319* 02320* 02321* 02323 02382 02403* 03182* 03183
03184 03192* 03229* 03287* 03288* 03289* 03290* 04044
04069* 04070* 04071* 04072 04073 04074 04075 04076
04966* 04967* 04968* 04969 05089 05140* 05639* 05912*
05913* 05914* 05915* 05916 05917 05918 05919 05920
05930* 05980 06013 06020* 06798* 06799* 06800* 06801*
06803 06804 06805 06806 06808 06809 06810 07697*
07698* 07700* 07701 07702 07703 07771 08602* 08603*
08604* 08605* 08607 08609 08610 08611 08612 08613
08642 08648* 08656* 08666 09471* 09472* 09473 09474
09475 09478 09582* 09583* 09584* 10336* 10387* 10388*
10389* 10390* 10394 10396 10397 10432* 10433* 10434*
10435* 10504*
CROHNS DISEASE OF COLON
00539* 00540* 00592 01676* 02099* 02128 02353* 03192*
03229* 03245 03292 03293 04122* 04209* 04214 05016*
05018* 05057 05976 05980 06013 06020* 06832* 06918*
07672 07737 07789* 07790* 08696 08720 08722* 08723*
09477 09521* 09546 09589 10393* 10449 10450 10467
10499* 10500*
CRYOSURGERY
06068* 06970* 09690
CUSHINGS SYNDROME
08178* 09698 09979*
CYST,CHOLEDOCHAL
05330
CYSTADENOCARCINOMA
07897* 08732
CYSTADENOMA
06943 07804
CYSTIC FIBROSIS
SEE ALSO MUCOVISCIDOSIS
06754 07795* 07797 07803 07866
CYSTS,APPENDIX
08702
CYSTS,BILIARY TRACT
01634 03496* 03540 06214* 06249 06962* 07136 07995
08034 08903 09806* 09808* 09825 09831 10581*
CYSTS,DUODENUM
05682
CYSTS,GALLBLADDER
03543 07128 07983*
CYSTS,GASTROINTESTINAL
00375 00806 00895 00896 02941 05356 10826
CYSTS,LARGE INTESTINE
00586 03260 07780 08653* 09566
CYSTS,LIVER
00358 00690 00691 01269 01270 01501 01799 02700
02932 03375 03378 04279 04284 04294 04296 04316
05155* 05186 06111 06120 06128 06958* 06962* 07897*
08074 08985* 09681 09694 09707 10607 10620 10638
10771*
CYSTS,MESENTERY
01719 04111* 07167 07176 08034
CYSTS,PANCREAS
02137 03089 03306 03311 03315 03317 03318 04220*
04224 04227 05111 05112 05118 06032* 06039 06046
06047 06048 06937 08034 10512* 10528 10534*
CYSTS,RECTUM
10495
CYSTS,SMALL INTESTINE
05882 07648*
CYSTS,STOMACH
03102 03110
CYTOLOGICAL DIAGNOSIS
02112 02113 07600 10565*
CYTOLOGY,EXFOLIATIVE
02717 09263 10199* 10205 10206
CYTOLOGY,LIVER
02454 02465 02731 03357 04266* 04529 04545* 04662
05431 05568 05703 06078

DEFECATION
00991* 06394 06840* 06852 09550
DEGLUTITION
00100 00253 00981* 00982* 01193* 02767 06380 06573
DEHYDRATION
01658* 04480 04491 04918*
DIABETES MELLITUS
01422* 01462 01543 01607* 02142 02246 02618* 02738*
03771 04225 04239* 04573* 05486* 05580 05942 06051*
06925* 07114* 07370 07452* 07552 07661 07898* 08770
08787 08954 09133* 09931* 09965 10201* 10264 10513*
10541
DIALYSIS
00259* 00718 01682* 06351*
DIAPHRAGM
SEE DIAPHRAGM HERNIA
SEE HIATUS HERNIA
DIAPHRAGM HERNIA
02619* 04764 05727 05732 05733 05734 05738 05741
05760 07539* 08378 08505 09264 09267 09285
DIAPHRAGM RUPTURE
03935 10650
DIARRHEA
00504* 00545* 00560 00597 00627* 01662* 01679* 01681*
01747 01748 01758 02337 02607* 02608* 02610* 02629
02644 02645 02651 02659 02660 02663 02668 02671
02672 02676 02678 03186* 03187* 03188* 03190* 03197
03198 03199 03204 03223* 03296 03545* 03562 03581
03582 03583 03942 04019* 04067 04081* 04089 04099
04210* 04211* 04212* 04464 04467 04480 04491 04573*
04608* 04780* 04973* 05337* 05353 05355 05390 05791
05941 06257* 06260* 06273 06275 06515 07149* 07153*
07180 07184 08012* 08037 08045 08946 08983 09297*
09551 09840* 09842* 09844* 09856 09865 10409* 10412*
10717* 10804* 10807* 10827 10845 10857* 10869

DIARRHEA IN CHILDREN
SEE ALSO CELIAC DISEASE
00827* 00828* 00878 01659* 01660* 01661* 01757 01771
02326* 05354 06256* 06258* 06262* 06280 06778 06812*
07150* 07713* 08626 08943 08944 09494 09864
DIARRHEA TREATMENT
01617 01658* 01771 01772 02326* 02638 02639 04104*
06262* 06264 07184 10804*
DIETARY DEFICIENCIES
00040* 02492* 02649 02650 02652 02706* 02852* 02882
02892* 03554 03805 04086 04087 05561 06439* 06441*
06445* 06472 06499 07197 07422 07427 07428 07434
07458 07858 08282 08621* 08867* 09056 09095 09108*
09128* 09822 10053* 10116* 10737*
DIETARY DEFICIENCIES IN LIVER INJURIES
05578 10610
DIETARY DEFICIENCIES IN MALABSORPTION
07718 08520* 10421
DIETARY DEFICIENCY IN LIVER INJURIES
02492*
DIETARY FACTORS
00027 00083 00178* 00212 00213 00233 00237 00548*
00641* 00768* 00829* 00871 00946* 00967 00975 00978
01035* 01043 01056* 01057* 01058* 01063 01103 01104
01106 01126 01128 01129 01131 01187 01318 01395*
01396* 01400* 01415* 01539 01540 01602* 01659* 01660*
01663* 01665* 01667* 01668* 01671* 01672* 01674* 01750
01763 01764 01769 01804* 01809* 01830 01842* 01908*
01952* 01998 02020 02040 02049* 02213 02217* 02220*
02257* 02338 02341 02575* 02606* 02709* 02816* 02824
02831 02849* 02851* 03119* 03379 03491* 03570 03578
03642* 03732* 03749* 03766 04050 04157 04275* 04325*
04389* 04469 04520 04553 04559 04625* 04638* 04639*
04653 04848* 04854* 05198 05405* 05422 05527* 05540*
05541* 05546* 05597 05605* 05606* 05614 05615 05618
05621* 05869 05873 05915* 05934 05949* 06034* 06185*
06216* 06261* 06351* 06366* 06415* 06417* 06503 06514*
06775 06932 07109* 07112* 07114* 07243* 07245* 07262
07301* 07302* 07305* 07317* 07344* 07368 07372 07426
07429 07460 07466 07477* 07493* 07711* 07715 07721
07757 07977* 08130* 08133 08139* 08177* 08185* 08203*
08262 08283 08286* 08406 08478* 08481* 08885* 09025*
09105* 09114* 09115* 09133* 09150 09158 09293* 09387
09572 09604 09684 09805* 09857 09910* 09915* 09983*
09999* 10017* 10051* 10054* 10074* 10122* 10123* 10130
10131 10229 10399* 10402* 10676*
DIETARY MALABSORPTION TREATMENT
00553* 06818* 06827 07709* 08613 08889 08932* 09504
10414*
DIETETIC THERAPY
02482 03994 04084 04307 04983 04989 05143* 06262*
06821 06947 07713* 08945 08971 09027* 09337 09705
10129 10411*
DIGESTION
SEE ALSO BILE
SEE ALSO PANCREAS
SEE ALSO SMALL INTESTINE
00251 00875 01756 05369 05465 07259 08348 09098
DIGESTION IN CHILDREN
08989
DIGESTION,CARBOHYDRATE
07451* 09487
DIGESTION,LIPID
04093 05617 07304* 07309* 07706* 07788*
DIGESTION,PROTEIN
03915 06414* 07462 08166*
DIGESTIVE ACTION OF BILE
07706* 08755*
DILATATION
02206 02207
DILATATION,STOMACH
06646
DISACCHARIDASE ACTIVITY
00878
DISACCHARIDASE DEFICIENCY
02102* 02329* 03188* 05641* 10410*
DISACCHARIDASES,SMALL INTESTINE
00236 00560 01157* 01158* 02329* 02339 03202 05641*
07451* 08618* 08988* 09027* 09480* 09499 09782* 09910*
10122* 10399* 10403* 10408* 10412*
DISEASES ASSOCIATED WITH BILIARY TRACT
00763* 01497* 01635 02178 06223* 06226 06950* 07113*
DISEASES ASSOCIATED WITH CANCER
06833* 07884 08933* 09573 10555*
DISEASES ASSOCIATED WITH CHOLELITHIASIS
00541* 06221* 09800* 10766*
DISEASES ASSOCIATED WITH CIRRHOSIS
00674 00709* 00710* 00711* 01600* 01607* 01608* 01610*
01799 02312 02557* 06193* 06195* 07101 07102 08871
08878 09787 10722 10739* 10740
DISEASES ASSOCIATED WITH ENTEROCOLITIS
00887
DISEASES ASSOCIATED WITH ESOPHAGUS
00362* 01292 06580 06591 07537*
DISEASES ASSOCIATED WITH GALLBLADDER
01627 02209 06247
DISEASES ASSOCIATED WITH GASTRECTOMY
00381 05764* 06683* 07993 09371
DISEASES ASSOCIATED WITH GASTRITIS
00418 02244 02245 06638 10209
DISEASES ASSOCIATED WITH GASTROINTESTINAL TRACT
00844 01708 01718 01745 02216* 02624 02628 03551
07178 08032 08933* 08954 10819 10820
DISEASES ASSOCIATED WITH HEPATITIS
00653* 00736 01493* 01580* 01581* 01589 01591 01599
02512* 06161* 07085 08870 09736 10690* 10722
DISEASES ASSOCIATED WITH HIATUS HERNIA
00387 00388 01273*
DISEASES ASSOCIATED WITH JAUNDICE
01625*
DISEASES ASSOCIATED WITH LARGE INTESTINE
00599 01430 01448 01675* 01685* 02384 02393 10393*
DISEASES ASSOCIATED WITH LIVER
00654* 00670 00678 00755 01485* 01489* 01491* 01494*
01497* 01515 01525 01542 01543 01549 01655* 02107*
06079 06186* 06988 06989 07654 08604 08805 08977
09414 09481* 10564* 10609 10627 10639 10644 10660
DISEASES ASSOCIATED WITH LIVER DISEASES
00668 00751 01657* 02451*
DISEASES ASSOCIATED WITH MALABSORPTION
00548* 00550* 00561 00563 00564 00647 00692 00694
01394* 01395* 01396* 01398* 01399* 01400* 01401 01406
01408 01668* 01684* 02288* 02326* 02328* 02329* 02330*
02331* 02332* 02333* 02334* 02335* 02342 02343 02409*
02618* 05927* 05929* 05946* 07954* 08617* 08628 10422
10424 10782 10814*
DISEASES ASSOCIATED WITH PANCREAS
00638 01465 02408* 02417 02418 02419 02420 06043
DISEASES ASSOCIATED WITH PANCREATITIS
00640* 00650 00804 01474 01476 02395 02416 06951*
07809 07810 07814 07817 09837 10541 10543
DISEASES ASSOCIATED WITH PARASITIC DISEASES
00555 01796 08070 09398 10857*
DISEASES ASSOCIATED WITH PEPTIC ULCERS
00144* 00391* 00459* 00479 00847 01351* 02253* 02320*
02321* 05802 06627 07511 07621* 08505 10228 10298
DISEASES ASSOCIATED WITH PORTAL HYPERTENSION
01487* 02190* 02203 02204 06075* 06105 06965*
DISEASES ASSOCIATED WITH REGIONAL ENTERITIS
02099* 02319* 02325 04968* 05914* 07704 08601* 08643*
08743*
DISEASES ASSOCIATED WITH SALIVARY GLANDS
00825*
DISEASES ASSOCIATED WITH SMALL INTESTINE
00512 00513 00538 00868 01371* 01666* 01667* 02290*
02293 02300 07707* 08526* 08537 09468 10410*
DISEASES ASSOCIATED WITH STOMACH
01303 01314 01352* 02241 02246 02256* 03722 06648
06661 10201* 10208
DISEASES ASSOCIATED WITH ULCERATIVE COLITIS
00611* 00612* 00613* 00620 01462 01647* 02397* 02398*
02399* 02400* 02403* 06023* 06024* 08643* 08721* 08725
09586* 09590
DISEASES ASSOCIATED WITH ULCERS
01343* 06731 10287
DISEASES ASSOCIATED WITH VIRAL HEPATITIS
00388 01250 01575* 06174 07053* 07079 07907* 09749
09766 10686* 10687* 10713
DISEASES IN CHILDREN,GASTROINTESTINAL
00845 01657* 02611* 02649 02651 02654 02663 02672
02673 02676 03204 03287* 03578 03592 05384 06278
07160
DISEASES IN CHILDREN,LIVER
03339* 03341* 03345* 03376 03382 04272* 05141* 05152*
05156* 05197 05199 05206 06121 06958* 06960* 06967*
06968*
DISEASES IN CHILDREN,PARASITIC
01784* 01787 06095 06296 07203 08067 06989 08990*
08992 08998
DISORDERS,STOMACH SECRETION
06524* 08474 09209* 10250
DISTENTION
00133* 00244 00637 01015* 02905*
DIURETIC AGENTS
00041* 01947 02451*
DIVERTICULA,DUODENUM
00416 00523 00525 01373 02312 03148* 03160 06781
06794 08576 09432* 09442 10356
DIVERTICULA,ESOPHAGUS
01283 02205 03019 05745 07540* 07572 08344 08351
08361 08362 08364 08365 08377 09284 10186
DIVERTICULA,GASTROINTESTINAL
09862
DIVERTICULA,LARGE INTESTINE
00570* 00571* 00590 00592 01448 02355* 03208* 03210*
03252 03263 03265 03680* 04115* 04144 04146 04147
04167 05021* 05067 05072 05961 05963 05967 06841*
06864 06866 06876 06906 07736 07737 07781 08644*
08646* 08693 09511* 09517* 09520* 09564 09577 10431*
10469 10475 10498

DIVERTICULA,SMALL INTESTINE
02310 02311 03150* 03151 03175 04037 04061 04067
04938 04944 04958 05877 06760 07679 08579 08627
09465
DIVERTICULA,STOMACH
00414 00415 00416 00523 02243 10218 10245
DIVERTICULITIS
04107*
DIVERTICULITIS TREATMENT
10460
DIVERTICULITIS,LARGE INTESTINE
00591 01445 01446 03212* 03224* 03251 03284 04125*
04170 04456* 04459* 05019* 05022* 08650* 08670 08694
10438* 10460
DIVERTICULITIS,SMALL INTESTINE
00524 10356
DIVERTICULUM,MECKELS
00309 00521 01223 01374 02305 04029 04932 04933
05411* 05910 06783 06796 07666 07674 07695 08530*
08547 08572 08587 08592 09462 10332* 10346 10347
10351 10352 10354
DIVERTICULUM,ZENKERS
08377 10177
DRUG ABSORPTION
00037* 00072 00083 00224 00979 02749 03635* 03657
04978* 06348* 07243* 07245* 08115* 08120* 08129* 08389*
09031 09062* 09925* 09926* 09927* 09936* 10022* 10648
DRUG EFFECTS ON ABSORPTION
01854 02061 02069 04544* 04560 05442* 05449* 05463
06348* 07239* 07240* 07241* 07242* 07249* 07250* 07321*
08119* 08241* 08242* 09913* 09927* 09940* 10403*
DRUG EFFECTS ON BILE SECRETION
02591 03757* 06465* 07315* 07338* 08244* 08884* 09153
DRUG EFFECTS ON BILIARY TRACT
00108 00342 00765* 00770* 00809 01075* 01145 01623*
01638 01959* 01963* 02157 02763* 02764* 02765* 02844*
02911* 03353* 03755* 04563* 04575* 04576* 04634* 04637*
05471* 05559 05574 05600 06379* 06396 06397 06483
07110* 07326* 07349* 09711*
DRUG EFFECTS ON ESOPHAGUS
04564* 04565* 04570* 06381
DRUG EFFECTS ON GALLBLADDER
01958* 02576* 02596 04576* 06377*
DRUG EFFECTS ON GASTROINTESTINAL TRACT
00831* 00860 00861 00965 00991* 01409 01648* 01735
01737 01743 01901 02062 02079* 02080* 02081* 02180
02216* 02761* 02907* 03553 03589 03710* 03813 03816*
05353 05362 06264 06272 07166 07607 09839* 10830
DRUG EFFECTS ON LARGE INTESTINE
00531 02385 03262 03608* 03678* 04123* 04147 05478
05949* 05970 10446 10491
DRUG EFFECTS ON LIVER
00192* 00211 00688 00696* 00697* 00704 01066* 01084*
01087* 01089* 01098 01099 01117 01119 01143 01144
01174* 01181 01490* 01499* 01522 01523 01540 01550
01556* 01557* 01558* 01559* 01560* 01562 01563 01564
01565 01971* 01977* 02021 02034 02460 02490* 02491*
02492* 02493* 02497 02498 02500 02503 02504 02505
02506 02507 02508 02560* 02710* 02837* 02842* 02846*
02847* 02848* 02860* 02865 02873 02883 02885 02933
03405* 03409* 03420* 03603* 03615 03616 03743* 03745*
03746* 03747* 03748* 03768 03769 03770 03772 03773
03777 03781 04018* 04335 04337 04338 04339 04340
04386* 04501* 04643* 04644* 04660 04661 04663 04666
04668 05209* 05211* 05401* 05543* 05547* 05548* 05550*
05557* 05558* 05576 05582 05584 05590 06440* 06461*
06463* 06478 07016 07032 07041* 07042* 07043* 07047
07319* 07323* 07325* 07336* 07337* 07338* 07345* 07360
07419 07578* 07891* 07892* 07901* 08237* 08243* 08245*
08276 08775 08819 08825* 09102* 09152 09801* 10016*
10033* 10034* 10043* 10050* 10051* 10065* 10070* 10721
DRUG EFFECTS ON METABOLISM
01980 02008 02071
DRUG EFFECTS ON MOTILITY
00095* 00098* 00118 00980* 00982* 00985* 00987* 00989*
00999 01003 01004 01005 01332* 01333* 01859* 01860*
01862* 01863* 01865* 01867* 01868* 01869* 01871* 01877
01889 01891 01899 01901 02127 02772 02775 02776
02779 03675* 03678* 03685 03686 03687 03691 04562*
04563* 04564* 04566* 04567* 04568* 04569* 04570* 04572*
04573* 04575* 04576* 04580* 04583 04585 04588 04590
05467* 05469* 05478 05480 05486* 05865* 06370* 06375*
06390 06391 06395 09942* 09955* 09956* 09961*
DRUG EFFECTS ON PANCREAS
00174* 00175* 00180 01059* 01935* 01938* 01939* 01947
02422* 02816* 02818* 02827 02828 02830 02908* 02918*
03308 04615* 04619* 04629* 04630* 05505* 05524* 05530*
05531* 06034* 06035* 06036* 06426* 06932 07208* 08200*
09091* 10004* 10005* 10008* 10013*
DRUG EFFECTS ON SALIVARY GLANDS
04593* 06303*
DRUG EFFECTS ON SMALL INTESTINE
00093* 00114 00528 00530 00531 00925 00943* 00948*
00951* 00990* 01161* 01380 01844* 02057* 02760* 02888*
02899 02912* 03633* 03675* 03794* 03797* 03806 03808
03815 04050 04503* 04533* 04546* 04562* 04569* 04670*
DRUG EFFECTS ON SMALL INTESTINE
CONTINUED
04671* 04963 05463 05480 05602* 05623* 05624* 05866
05873 05915* 06370* 06371* 06390 06697* 07204* 07207*
07270* 07578* 08151* 09484* 09904 09960* 10379
DRUG EFFECTS ON STOMACH
01044 01300* 01322 01323 01340* 01877 02258* 02273
02754* 02755* 02796* 02800* 03045* 03059* 03612 03724
03832* 03899* 03956 04566* 04786 04820 05410* 05434*
05467* 05469* 05486* 05493* 05503* 05626* 05808 06348*
06619* 06641 06698* 07263* 07297* 07578* 07581* 07592
08129* 08181* 08205* 08387* 08462 09048 09079* 09291*
09376* 09379* 09380* 09420 09948* 10243 10266* 10280*
10312
DRUG EFFECTS ON STOMACH SECRETION
00133* 00135* 00136* 00140* 00142* 00147* 00149* 00150*
00155 00160 00161 00393* 00485 00488 01009* 01017*
01020* 01021* 01023* 01024* 01025* 01027* 01028* 01031*
01032* 01033* 01040 01041 01334* 01347* 01862* 01920*
01923 01924 02785* 02787* 02792* 02798* 02799* 02801
02803 02805 02807 02808 02809 02811 02814 03054*
03133* 03701* 03703* 03708* 03714* 03723 03728 03729
04603* 04609* 04610 05485 05487* 05488* 05505* 05508*
05510* 05515 05519 05820* 05832* 06401* 06405* 06409*
06410* 06420 06690* 06696* 06704 07280* 07290* 07298
08184* 08489 09069* 09070* 09072* 09081 09171* 09994*
09997
DRUG METABOLISM
00955* 03635* 04162 06449* 07243* 07391 08241* 08242*
10004* 10648 10844
DRUG METABOLISM,LIVER
00218 00219 00223 00224 00232* 01074* 01075* 01089*
01144 01146 01147 01550 01559* 01950* 01963* 01974*
02032 02037 02862* 02872 02883 02887 03351* 03745*
03746* 03748* 03751* 03785 04322 04640* 04641* 04665
04668 05284 05543* 05550* 05551* 05565 05576 05582
05590 06442* 06446* 06447* 06448* 06456* 06457* 06493
06495 07324* 07353 07363 07887 08222* 08228* 08243*
08245* 08278 09107* 09108* 09115* 09118* 09134* 09153
09227 10034* 10037* 10055* 10065*
DRUG TREATMENT OF BILIARY TRACT
01638 03506 06074* 07105* 07133 08910
DRUG TREATMENT OF ESOPHAGUS
01274* 01276 04723* 07536* 07541* 07544 09239* 10839
DRUG TREATMENT OF GALLBLADDER
02571* 03506 03532 03533 06212*
DRUG TREATMENT OF GASTROINTESTINAL TRACT
00534 00539* 00831* 00862 00863 00864 00865 00866
00867 00898 01321 01355 01649* 01677* 01684* 01735
01736 01739 01740 01741 01742 01744 01745 01746
01747 01748 01749 01750 01751 01752 01753 01754
01755 01781 01786 01788 02365 02613* 02616* 02617*
02635 02637 02638 02639 02640 02642 02645 02659
02660 02672 03591 03595 04014 04483 05347 05374
06257* 06273 10839
DRUG TREATMENT OF LARGE INTESTINE
02348* 02356* 03286* 04124* 04209* 05006* 05020* 05053
05956* 05976 05989 05990 05995 06003 06014 06021*
06030 08666 09582* 09583* 09956* 10470
DRUG TREATMENT OF LIVER
00664 00733 01532 02453 02494* 02501 02514* 02561*
02563* 02564* 03358 03404 03407* 03418 03486 04280
04281 04285 04319 04364 04370 05143* 05201 05254*
05256* 06092 06103 06144* 06160* 06166* 06178 06185*
06202 06957* 07019 07846* 07894* 08820 09634* 09646*
09671 09699 09885 10588* 10717* 10727*
DRUG TREATMENT OF PANCREAS
00649 01466 04255 05122* 06054
DRUG TREATMENT OF PARASITES
03597* 04499
DRUG TREATMENT OF PEPTIC ULCERS
00438* 00467 00489 00493 00494 00495 00496 01329*
01330* 01331* 01345* 01353 01354 01355 03126* 03129*
03137 03967* 03973* 03974* 03999 04769* 04845* 04851*
04861* 04876 04877 04879 05820* 05825* 05845 06686*
06706 07619* 07642 09427* 10292 10313 10314
DRUG TREATMENT OF SMALL INTESTINE
00544 00551* 01393* 03152 04804 05865* 05913* 08666
09583*
DRUG TREATMENT OF STOMACH
01316 03054* 03068 03069 03071 03072 03106 03107
03591 04773* 04804 05777 06626 07592 08468 09079*
09296* 09319 09348 09377* 09419
DRUG TREATMENT OF ULCERATIVE COLITIS
02396* 02404* 06915* 06919* 06924 09596
DRUG TREATMENT OF ULCERS
01332* 01333* 02258* 03118* 03701* 03967* 04845* 04851*
06690* 06696* 08485* 10276* 10277*
DRUG-INDUCED LIVER INJURIES
04324* 04329* 04331* 05209* 05210* 05211* 05212* 05213*
05216 05217 05218 05219 05233 05655* 06148 06150
06151 06152 06153 06154 06157 06158 07038* 07043*
07048 07416 08840 09651* 09717* 10672* 10674*

DRUG-INDUCED PANCREATITIS
01468* 10537*
DRUG-INDUCED ULCERS
00419 00432* 00434* 00435* 00436* 02257* 02264* 02272
03045* 03052* 03956 03968* 04018* 04769* 04810 04850*
04861* 04888 05503* 06657* 08479* 09420 10266* 10270*
10278* 10279*
DRUGS IN LIVER INJURIES,CONTRACEPTIVE
01565 01963* 02436* 02495* 02498 04661 07050* 07892*
08824* 09679 09710*
DUBIN-JOHNSON SYNDROME
00653* 01495* 01496* 01554 02106* 02449* 04261* 04311
07952 09685 10614 10622
DUCTS,PANCREAS
00063* 00821 02715* 08733 10522
DUMPING SYNDROME
00504* 03068 04805 08550 09425*
DUMPING SYNDROME,GASTRECTOMY-INDUCED
00256* 01339* 01340* 01341* 02267* 04773* 04846* 04854*
05827* 06617* 08503 08512 09331 10210 10284*
DUODENITIS
00514 00534 03166 06777 08553 08583
DUODENUM
SEE ALSO SMALL INTESTINE
04044 09181*
DUODENUM ANOMALIES
00502* 03147* 03161 04047 05882 05903 08542 08550
08590 08591
DUODENUM BIOPSY
08323 10367
DUODENUM CANCER
03168 03169 03170 03172 04043 10369
DUODENUM CYSTS
05882
DUODENUM DIAGNOSIS
00259* 00267* 00296 00304 00305 00307 00637 01012*
02110 02118 02169 03174 08523* 09437 10330*
DUODENUM DISEASES
03173 07682 09418 09437 09440
DUODENUM DIVERTICULA
00416 00523 00525 01373 02312 03148* 03160 06781
06794 08576 09432* 09442 10356
DUODENUM ENDOSCOPY
10134*
DUODENUM ENZYMES
09173*
DUODENUM FISTULAS
07522 08491 08665 08966 09477 09838 10509*
DUODENUM HISTOLOGY
00452*
DUODENUM IN CHILDREN
00502* 08291* 08323 08404 08545 09846*
DUODENUM INJURIES
04231 08023 08545
DUODENUM MORPHOLOGY
00506* 00514
DUODENUM MOTILITY
00430 01863* 01865* 01886 02757* 08144 09946* 09947*
09952* 09957* 09962 10349
DUODENUM MUCOSA
03487
DUODENUM NEOPLASMS
00515 02297 02299 02300 08563
DUODENUM NEOPLASMS,BENIGN
01391 06748 07750
DUODENUM NEOPLASMS,MALIGNANT
00846 02298 02303 06791 07660 07684 07686 08581
08593 08729 09451 09457 10371
DUODENUM OBSTRUCTION
00526 01376 02299 02318 05862* 08392* 08523* 08894
DUODENUM PATHOLOGY
08144 08597
DUODENUM PERFORATION
01373 01378 02257* 02281 02312 08548
DUODENUM POLYPS
01390
DUODENUM RADIOLOGY
00297 00497 02118 02137 02275 03161 07525 07682
07750 08315 08404 08447 08581 08597 09432* 09438
09442 09609 09794* 10330* 10798
DUODENUM RUPTURE
07676 07678 10357
DUODENUM SECRETION
01914* 02048* 02789* 07307* 09088* 09173* 10107
DUODENUM SURGERY
01326 01391 03148* 03169 03172 04042 04231 04251
05835 08033 10395
DUODENUM TRAUMA
02299 07677
DUODENUM ULCERS
00258* 00267* 00443* 00444* 00445* 00448* 00449* 00450*
00452* 00457* 00459* 00471 00476 00488 00489 00491
00492 00920 01332* 01333* 01334* 01337* 01338* 01342*
01344* 01346* 01347* 01353 01356 01358 01359 02250*
02252* 02253* 02256* 02257* 02259* 02281 03120* 03121*
03125* 03127* 03128* 03131* 03132* 03139 03170 03174
DUODENUM ULCERS
CONTINUED
03980 05835 05836 05840 05849 05857 05859 06688*
06689* 06690* 06696* 06700* 06701* 06703 06704 06707
06714 06720 06729 06734 07584* 07616* 07518* 07622*
07623* 07627* 07628* 07633 07634 07635 07640 07643
07644 08393* 08438 08447 08477* 08481* 08482* 08484*
08488 08496 08500 08509 08511 08514 08515 08517
09171* 09209* 09378* 09391 09398 09402 09408 09413
09416 09422 09993* 10267* 10270* 10271* 10274* 10275*
10276* 10277* 10282* 10283* 10285* 10287 10290 10293
10299 10300 10303 10310 10318 10325 10326 10531*
10817*
DUODENUM,FOREIGN BODIES IN
01378 09846*
DYE STUDY TECHNIQUES
SEE MARKER STUDIES
DYSENTERY
SEE ALSO AMEBIASIS
SEE ALSO SHIGELLOSIS
SEE ALSO TYPHOID FEVER
01774 02614* 02643 02659 02693 04494 07163 08942
08978 09580 10821 10827 10864
DYSENTERY DIAGNOSIS
07189 08706
DYSENTERY EPIDEMIOLOGY
05349 07165 10821
DYSENTERY IMMUNOLOGY
10831
DYSENTERY IN CHILDREN
05349 05350
DYSENTERY PATHOLOGY
09571 10841
DYSENTERY THERAPY
05346
DYSENTERY TREATMENT
07172 10831
DYSPEPSIA
00457* 01321 02247 03054* 03072 03106 03133* 03856
04084 04786 04979 05390 05777 09309 09375 09378*
09871
DYSPHAGIA
04233 08374 09238* 09247 10166* 10177 10182
DYSPHAGIA,ESOPHAGUS
00384 04726* 04733* 05756 07573

ECHOGRAPHY
02938 02944 02978 05642* 07509 10128 10509* 10521
10534*
EDEMA
02604* 07648* 07650* 08595 08637 08763*
ELECTROLYTE ABSORPTION
02742* 06346* 07240* 08116* 08121* 08290* 09034
ELECTROLYTE EXCRETION
08018* 09560 10101* 10103* 10345* 10504*
ELECTROLYTE METABOLISM
02406 02442* 02736* 02737* 05352 06506* 07185 07665
08716 09163 10741
ELECTROLYTE METABOLISM IN CIRRHOSIS
07092* 07968
ELECTROLYTE METABOLISM IN GASTROINTESTINAL TRACT
06356 10833
ELECTROLYTE METABOLISM,LIVER
00064* 00071 02443* 08917
ELECTROLYTE SECRETION
01161* 10121*
ELECTROLYTE SECRETION,PANCREAS
00628* 01941* 01942* 08205*
ELECTROLYTE SECRETION,STOMACH
00139* 00140* 00150* 00164 00625* 02921 08205* 08290*
09063* 09067* 09084 09976*
ELECTROLYTES
00104 00246 01019* 01301* 01369* 01475 01658* 02443*
ELECTROLYTES,SERUM
06162* 06194* 06722 06780 08205* 08917 10426*
ELECTRON MICROSCOPY
00480 00536 00551* 00636 10125*
ELECTROPHORESIS
00017* 01049* 01204* 01836* 07069 07082 07400 07925
07928 08154* 08158 08204* 09055* 09142 09175* 09985*
10664 10714*
ELECTROPHYSIOLOGY
00059* 00069 00071 00080 00086 00088* 00091* 00092*
00107 00110 00121 00122 00246 00247 00248 00445*
00624 00983* 00985* 00986* 00992* 00993 00995 00997
00998 01000 01001 01027* 01213 01352* 01859* 01861*
01864* 01873* 01880 01881 01882 01883 01884 01885
01886 01887 01892 01893 01894 01895 01896 01897
02732* 02733* 02734* 02736* 02754* 02756* 02757* 02758*
02759* 02760* 02770 02773 02774 02778 02788* 02987
03638* 03641* 03676* 03679* 03684 03694 04047 04188
04545* 04567* 04568* 04571* 04572* 04573* 04577* 04578*
04579* 04583 04591 05381 05414* 05439* 05464 05468*
05469* 05477 05482 06342* 06366* 06367* 06368* 06371*
06372* 06373* 06427* 07265*

EMBRYOLOGY
00001* 00031 00102 00832 01150 01367* 01420* 01812
02628 02714* 04512 04601* 04605* 07213 07843* 08085*
08255 09007 09892* 10032* 10059* 10823
EMESIS
SEE ALSO VOMITING
00831*
ENCEPHALOPATHY
09488
ENCEPHALOPATHY,HEPATIC
00666 00741* 01504 02082* 02563* 02564* 04292* 04405
06077 06088 06129 06185* 06186* 07841* 07842* 07847*
08779 09661 09665 09678 09700 10161* 10553* 10637
10670 10675* 10692* 10725* 10727* 10738* 10743
ENDOMETRIOSIS
01452 01702 03063 05972 06270 07779 08060 08574
ENDOSCOPY
07505 08307
ENDOSCOPY IN BLEEDING DIAGNOSIS
06569* 09207* 10151 10835
ENDOSCOPY IN CANCER DIAGNOSIS
06668 10232
ENDOSCOPY,ABDOMEN
00322 00323 00349 00835 00838 07174 08306
ENDOSCOPY,ANESTHESIA IN
07486*
ENDOSCOPY,BILIARY TRACT
00340 10145
ENDOSCOPY,DUODENUM
10134*
ENDOSCOPY,ESOPHAGUS
00255* 00277 00278 00280 00281 00409 02206 06596
07543* 07572 08358 08386 09241* 09276 10194
ENDOSCOPY,GASTROINTESTINAL
00344 00348 07486* 08304 09207* 10847
ENDOSCOPY,LARGE INTESTINE
00315 00316 00317 06530* 07738 07749 07760 07763
09198* 09513* 09556
ENDOSCOPY,PERITONEUM
00350 08074 09350 09360 09785 10153 10232 10563*
ENDOSCOPY,RECTUM
06910
ENDOSCOPY,SMALL INTESTINE
00305 00306 00315 08553 08738 09212*
ENDOSCOPY,STOMACH
00255* 00282 00283 00284 00285 00286 00287 00288
00289 00298 00424 01331* 04718 04840 05635* 05782
05817 06651 06678 06679 07501 08291* 08419 08422
06565 09229 09292* 09338 10148 10195*
ENEMA
08672
ENTERITIS
SEE ALSO COLITIS
SEE ALSO ENTEROCOLITIS
SEE ALSO GASTROENTERITIS
02610* 03591 04486 05348 05355 06773 07168 08058
08940* 09445 09467 09842* 10230*
ENTERITIS DIAGNOSIS
00890
ENTERITIS DIAGNOSIS,REGIONAL
04968* 05911* 05920
ENTERITIS IN CHILDREN
05080 05084 06746* 06785 06803 06821 08525* 08583
08585 08608 09871
ENTERITIS PATHOLOGY
08607 08940*
ENTERITIS TREATMENT,REGIONAL
05917 06021*
ENTERITIS,DISEASES ASSOCIATED WITH REGIONAL
02099* 02319* 02325 04968* 05914* 07704 08601* 08643*
08743*
ENTERITIS,REGIONAL
00541* 00544 01680* 01714 02320* 02322* 02323 02324
02382 02396* 03182* 03183 03184 03287* 03295 03296
04044 04069* 04070* 04071* 04072 04073 04074 04075
04076 04794 04966* 04967* 04969 05913* 05914* 05915*
05916 05918 05919 05980 06013 06746* 07670 07699*
07790* 08601* 08606 08643* 08743* 09476 10391* 10392*
10395
ENTEROCHROMAFFIN CELLS
06914* 07449*
ENTEROCOLITIS
SEE ALSO COLITIS
SEE ALSO GASTROENTERITIS
00887 00888 00889 01717 02626 03288* 03297 03299
04134 04210* 04211* 04212* 08961
ENTEROCOLITIS DIAGNOSIS
00353 05093 07154* 09235
ENTEROCOLITIS EPIDEMIOLOGY
06020* 08961
ENTEROCOLITIS ETIOLOGY
00885 06008 08051 08525*
ENTEROCOLITIS IN CHILDREN
00886 03228* 05093 07154* 08962 09441
ENTEROCOLITIS NECROTICANS
03228* 07154* 08525* 08657* 09441
ENTEROCOLITIS PATHOLOGY
03228* 05092 05094 08657*
ENTEROCOLITIS TREATMENT
00827* 05347 06014 06020* 06031 08533
ENTEROCOLITIS,DISEASES ASSOCIATED WITH
00887
ENTEROCOLITIS,PSEUDOMEMBRANOUS
00886 07186
ENTEROCOLITIS,STAPHYLOCOCCAL
08657*
ENTEROKINASE
01156* 06308*
ENTEROPATHY,PROTEIN-LOSING
00564 00877 01404 01766 02054* 02340 02649 02800*
03203 03203 04096 04111* 04456* 04481 04488 04781*
04811 04975* 04980 04995 04996 05779 05933 05935
06298 06824 10390* 10847
ENVIRONMENT FACTORS
00141* 00144* 00731* 01068* 01365 01458* 01486* 01573*
01809* 02283 02565 02566
ENZYME SECRETION,LIVER
09639*
ENZYME SECRETION,PANCREAS
00176* 00177* 00178* 00185 01053* 01057* 01063 01933*
01936* 01937* 01939* 01943 02816* 02817* 02822* 08198*
08202* 08204* 08207 09092* 09620* 10008* 10012* 10013*
10014* 10339*
ENZYME TREATMENT OF GASTROINTESTINAL TRACT
08474 10837
ENZYMES
SEE ALSO AMYLASE
SEE ALSO PANCREAS SECRETION
SEE ALSO STOMACH SECRETION
02468 07037 08850 10545
ENZYMES,DUODENUM
09173*
ENZYMES,GASTROINTESTINAL
00787 01190 01362 01856 02065 02075 02909* 05604*
09057 09177
ENZYMES,LARGE INTESTINE
02399* 06311* 06512* 08108 09906
ENZYMES,LIVER
00020* 00193* 00195* 00201* 00203* 01082* 01083* 01096
01104 01106 01107 01108 01109 01110 01111 01112
01113 01114 01115 01116 01117 01118 01119 01120
01121 01122 01123 01151 01192 01522 01534 01536
01544 01545 01546 01547 01549 01550 01559* 01614
01808* 01951* 01952* 01953* 01954* 01971* 01972* 01978
01979 01980 01981 01982 01983 01984 01985 01986
01987 01988 01989 01990 01991 01992 01993 01997
02010 02015 02018 02020 02025 02028 02045 02438*
02466 02502 02513* 02522 02841* 02853* 02855* 02856*
02857* 02863* 02869 02870 02871 02875 03341* 03351*
03353* 03354* 03398 03399 03410 03411 03413 03417
03419 03421* 03426* 03427* 03450 03460* 03644* 03742*
03746* 03761* 03764 03774 03777 03778 03780 03786
03788 03789 03813 04247 04293 04298 04407* 04633*
04635* 04638* 04644* 04652* 04653 04706 04710 04712
05172 05204 05401* 05421 05424 05464 05538* 05540*
05551* 05552* 05561 05564 05566 05567 05577 05579
05583 05584 05590 05595 05597 06108 06115 06137
06145* 06146* 06184 06194* 06331 06332 06333 06432*
06439* 06440* 06444* 06451* 06457* 06458* 06461* 06467
06474 06486 06492 06513* 06538* 07029 07030 07229
07234 07235 07311* 07321* 07322* 07325* 07336* 07340*
07341* 07344* 07356 07358 07359 07361 07371 07377
07382 07386 07388 07392 07395 07396 07397 07398
07399 07400 07401 07403 07404 07405 07406 07407
07408 07409 07411 07419 07423 07425 07432 07433
07436 07437 07438 07439 07440 07441 07442 07444
07446 07452* 07492* 07836* 07887 07958* 08081* 08110
08233* 08236* 08238* 08243* 08244* 08249* 08261 08265
08269 08270 08271 08272 08274 08279 08280 08283
08756* 08800 08817 09103* 09113* 09126* 09145 09161
09167 09631* 09664 10038* 10039* 10043* 10059* 10063*
10066* 10076* 10096 10104* 10596
ENZYMES,LIVER SERUM
SEE ALSO ALKALINE PHOSPHATASE
SEE ALSO LIVER DISEASE DIAGNOSIS
00274* 01050* 06443* 06526* 06558 06980 07367 07484*
07506 07822* 07831* 07834* 07934 10066* 10067* 10074*
10085 10574* 10629 10630 10631 10680* 10689* 10702
10811*
ENZYMES,PANCREAS
SEE ALSO PANCREAS DISEASE DIAGNOSIS
00267* 00353 00646 00828* 01049* 01056* 01468* 01469*
01472 01473 01932* 01940* 01943 01944 01948 02328*
02615* 02716* 02815* 02819* 02820* 03304* 03323* 03324*
03733* 03734* 03736* 03737* 03738 04235* 04242* 04242*
04617* 04618* 04620* 04621* 04625* 04626* 04627* 05131
05525* 05526* 05527* 05528* 05532* 05537 06044 06417*
06423* 07301* 07302* 07305* 08199* 08888* 09055* 09087*
09100 09234 09601 09713* 10000* 10006*

ENZYMES,PLASMA
02087* 07824* 08727* 08953
ENZYMES,SALIVARY GLAND
02781* 05417* 08152* 08156 09054* 09055* 10815*
ENZYMES,SERUM
01342* 01945 02522 03046* 03361 03526 03573 04298
04317 04368 04416* 04606* 04694* 04703* 04712 04849*
04854* 05119* 05210* 05523 05616 05658* 06145* 06154
06168* 07011 07094* 07483* 08286* 08859 08888* 08895
08935* 08936* 09788 10143 10546
ENZYMES,SMALL INTESTINE
00060* 00230* 00231* 00233 00507* 00828* 01155* 01156*
01397* 01802* 02047* 02049* 02051* 02074 02102* 02674
02748* 02822* 02889* 02890* 02893* 02899 02912* 03191*
03192* 03601* 03607* 03619 03651 03794* 03797* 03800*
03801* 03810 03811 03813 04046 04503* 04669* 04672*
04675* 04676* 04678* 04680 04681 04971* 04974* 04982
05601* 05603* 05604* 05605* 05610* 05616 05618 05620
05854 05922* 05923* 05937 05938 06035* 06308* 06310*
06311* 06339 06507* 06512* 06513* 07094* 07188 07222
07242* 07451* 07452* 07457 07492* 08092 08093 08108
08284* 08286* 08288 09169* 09170* 09175* 09485 09500
09906 10099* 10104* 10105* 10110 10111 10126*
ENZYMES,STOMACH
00152* 00172 00484 00487 01045 01920* 01927 01928
01929 02793* 02794* 02799* 02806 02917* 03704* 03718
03762* 04006 04596* 04600* 04602* 04603* 05490* 05491*
05511 06417* 07280* 07282* 07288* 07289* 07296* 07487*
08080* 08083* 08097 08471 08483* 09076* 09381* 09984*
09995* 10203* 10223
ENZYMES,URINARY
02949 05119* 06619* 08935* 08936*
EPINEPHRINE
02755* 07318* 10024* 10806*
ESCHERICHIA COLI
02045 07149* 07153* 07168 07450* 08019* 08556 08962
08983 09871 10735* 10770*
ESOPHAGITIS
00364* 00366* 00381 00382 00383 00384 00386 01272*
01280 02094* 02109 02197 03003* 03004* 03005* 03869*
04728* 04748 04754 04766 04776* 05633* 05751 06567*
07537* 07570 08385 09243*
ESOPHAGITIS,EXPERIMENTAL
00373
ESOPHAGUS
SEE ALSO ACHALASIA
SEE ALSO HERNIA
SEE ALSO HIATUS HERNIA
07469
ESOPHAGUS ANOMALIES
00371 00374 01295 02977 03035 03876 03885 04731*
04759 05720* 05723* 05724* 05730 05761 07538* 10187
10850
ESOPHAGUS ATRESIA
00368 00369 00370 02108 02977 03876 04731* 04737
04739 04744 04752 04753 05730 05757 05761 06594
07542* 08342 09255 09261 09269 10163* 10164* 10183
ESOPHAGUS BIOPSY
04705* 05633*
ESOPHAGUS CANCER
02956 02993* 02995* 02998* 02999* 03002* 03008* 03010
03020 03021 03028 03033 03040 03868* 03875 04726*
04736 04760 05489* 05654* 05722* 05724* 05742 05743
05746 05750 05755 05778 05935 06581 06582 06604
07553 07560 07564 08349 08363 08369 08370 08371
09273 09286 10162* 10178 10190 10191 10192
ESOPHAGUS CARCINOGENESIS
09287
ESOPHAGUS CIRCULATION
00281 00901* 03606* 05426 05663 06522 06585
ESOPHAGUS DEVELOPMENT
07538*
ESOPHAGUS DIAGNOSIS
00255* 00277 00278 00279 00280 00281 01193* 01194*
01272* 02094* 02108 02109 02188* 02192 02212 02956
02965* 03014 03023 03044 03878 04699* 04705* 04741
05633* 05654* 05661 05662 05663 05722* 05734 05745
05748 06563 06570* 06602 06603 07513 07535* 07540*
07553 08335* 08381 09243* 09263 10170
ESOPHAGUS DISEASE EPIDEMIOLOGY
05755
ESOPHAGUS DISEASE ETIOLOGY
05755
ESOPHAGUS DISEASES
01281 03027 03561 03886 03887 03891 03896 04723*
04725* 04745 05384 05633* 05663 05729 05754 05756
07535* 07536* 07540* 07562 07568 08332* 08350 08353
08386 09262 09271 09279 10159*
ESOPHAGUS DIVERTICULA
01283 02205 03019 05745 07540* 07572 08344 08351
08361 08362 08364 08365 08377 09284 10186
ESOPHAGUS DYSPHAGIA
00384 04726* 04733* 05756 07573
ESOPHAGUS ENDOSCOPY
00255* 00277 00278 00280 00281 00409 02206 06596
07543* 07572 08358 08386 09241* 09276 10194
ESOPHAGUS FISTULAS
00368 00369 00370 02202 04731* 04739 04753 05723*
07542* 07548 08342 08382 09250 10183
ESOPHAGUS HISTOLOGY
01811 03034 04526 06571* 07519 09053* 10167*
ESOPHAGUS IN CHILDREN
00370 00371 00375 00378 01281 01294 01874 01875
02188* 02206 02977 02996* 03022 04754 04762 04765
04768 05723* 05731 05734 05738 05739 05752 06380
06573 06600 07541* 07542* 07556 08332* 08337 09237*
09255 09270 09280 09282 10163* 10164*
ESOPHAGUS INJURIES
04735 04743 04746 04754 04755 04766 04767 05735
05736 05749 06571* 07541* 07544 08375 09287
ESOPHAGUS MANOMETRY
02992* 03682* 03690 05466* 05719 06589 07535* 07552
07568 08336* 09237* 09241* 09270 09272
ESOPHAGUS MICROORGANISMS
03039 07536* 07540*
ESOPHAGUS MORPHOLOGY
00102 00901* 01810 02701* 03026 03606* 03667* 04526
05426 05720*
ESOPHAGUS MOTILITY
00087* 00099 00100 00980* 00981* 00993 00994 01193*
01194* 01859* 01874 01875 02263* 02664 02752* 02753*
02766 02767 02768 02769 02772 02965* 02994* 03000*
03024 03666* 03667* 03682* 03688 03690 04561* 04564*
04565* 04586 04587 04723* 04725* 04726* 04727* 04729*
04733* 04745 04747 04765 05466* 05472 05473 05757
05758 06605 07519 08136* 08145 08332* 09243* 09965
ESOPHAGUS MUCOSA
02718 05489* 10168
ESOPHAGUS NEOPLASMS
01288 01289 02198 03890 08376
ESOPHAGUS NEOPLASMS,BENIGN
01285 01286 06574 08359 09248 10176
ESOPHAGUS NEOPLASMS,MALIGNANT
00361* 00362* 00363* 00376 01287 01290 02199 02200
02201 07548 07569 08339 08343 08347 08372 08373
08383 09243* 09244 09258 09259 09260 09268 09276
10189 10193
ESOPHAGUS OBSTRUCTION
02994* 04734 05726 05757 06586
ESOPHAGUS PATHOLOGY
00375 01284 02605* 07535*
ESOPHAGUS PERFORATION
00376 00377 00378 02191* 02192 02193 02991* 03016
03023 03041 03883 03889 04743 04746 04761 04768
05725 05735 05736 05737 05744 05749 06596 07567
08334* 08354 09254 10171
ESOPHAGUS POLYPS
01280
ESOPHAGUS PROSTHESIS
03888 04760 07574 08343
ESOPHAGUS RADIOLOGY
00279 00373 01290 02110 02212 02965* 02977 03018
03032 03892 04699* 04742 05383 05472 05745 06537*
06575 06576 06577 06601 06604 06605 07519 07536*
07538* 07551 07552 07565 07573 08344 08364 09240*
09241* 09242* 09250 09272 10138* 10139 10168 10186
10187 10194
ESOPHAGUS REFLUX
00281 00364* 00365* 00366* 00367* 00381 00382 00384
01276 01297* 02187* 02188* 02189* 02992* 02996* 02997*
03001* 03004* 03005* 03009* 03014 03015 03018 03022
03044 03869* 03870* 04724* 04725* 04728* 04730* 04732*
04733* 04734 04747 04748 04758 04763 05721* 05731
05751 06584 06602 07549 07557 08136* 08335* 09247
09966* 10138* 10165* 10170 10173
ESOPHAGUS RUPTURE
00360* 01278 02193 02195 03872 03881 04750 06570*
07554 07555 07561 10172
ESOPHAGUS SPHINCTER
02211 02752* 02768 02769 02772 02992* 03001* 03009*
03024 03025 03688 04564* 04565* 04570* 04587 04727*
04727* 04729* 05466* 05472 05473 08020* 08136* 08336*
09961*
ESOPHAGUS STRICTURE
00381 00382 01291 01292 01293 01294 02186* 02206
02207 02211 02998* 03000* 03002* 03004* 03029 03886
04734 04738 04755 04758 05720* 05752 06598 07541*
07546 07563 07571 07575 08338 08356 08385 09238*
09257 09265 09269 09280 09281 09287 10164* 10165*
10166* 10187
ESOPHAGUS SURGERY
00363* 00385 01271* 01275 01282 01293 02088 02108
02186* 02187* 02188* 02189* 02191* 02208 02209 02991*
02993* 02995* 02996* 02997* 02998* 02999* 03000* 03001*
03002* 03003* 03005* 03006* 03007* 03008* 03009* 03015
03017 03026 03029 03031 03036 03037 03042 03043
03869* 03871 03873 03873 03877 03877 03883 03884
03884 03888 03892 03892 04724* 04730* 04731* 04732*
04733* 04736 04739 04742 04747 04749 04753 04755

ESOPHAGUS SURGERY
CONTINUED
04757 04761 04763 04767 05489* 05721* 05747 05752
06576 06577 06584 06585 06586 06587 06620* 07537*
07538* 07539* 07547 07550 07558 07560 07563 07566
07571 07575 08338 08340 08341 08343 08345 08346
08348 08349 08354 08359 08368 08375 08379 08381
08410 09237* 09249 09256 09257 09261 09266 09274
09278 09284 10158* 10159* 10163* 10164* 10173 10188
10214
ESOPHAGUS TRAUMA
00372 00387 01291 02194 02207 03011 03034 03872
03879 03881 03883 03885 03889 04743 05735 05736
05740 05749 10171
ESOPHAGUS TREATMENT
00380 02190* 02207 02210 02213 02666 02994* 02998*
03000* 03009* 03016 03021 03033 03036 03876 03880
03883 03894 03895 03897 04724* 04726* 04728* 04730*
04734 04737 04741 04744 04751 04752 04766 05739
05744 05746 05753 06570* 07542* 08355 08365 10172
ESOPHAGUS ULCERS
03874 07638 08334*
ESOPHAGUS ULTRASTRUCTURE
01810 02718
ESOPHAGUS VARICES
01277 01487* 01609* 01647* 02190* 02203 02204 02914*
02991* 03037 03480 03867* 03880 03893 03894 03895
03897 04489 04492 04740 05728 05739 05762 06568*
06597 06599 07543* 07576 07953* 08333* 08352 08360
08380 08384 08754* 08796 08864* 09239* 09242* 09666
10161* 10164* 10169 10175 10179 10180 10570* 10734*
10754 10805* 10863
ESOPHAGUS.DISEASES ASSOCIATED WITH
00362* 01292 06580 06591 07537*
ESOPHAGUS.DRUG EFFECTS ON
04564* 04565* 04570* 06381
ESOPHAGUS.DRUG TREATMENT OF
01274* 01276 04723* 07536* 07541* 07544 09239* 10839
ESOPHAGUS.FOREIGN BODIES IN
00379 01279 02196 03882 05737 09265
ESOPHAGUS.HORMONAL CONTROL OF
00087*
ESOPHAGUS.NERVOUS CONTROL OF
00102 00980* 02767 03012 05729 06589 09965
ESOPHAGUS.TOXIC EFFECTS ON
00373 03879 04735 04746 04754 04755 04766 04767
05740 06571*
ETHIONINE
02490* 05569 06303* 07334* 07906 08231* 09106* 10054*
ETHNIC FACTORS
04612 05287* 05921* 05928* 06189* 06329 06569* 06621*
06682* 06920* 07284* 07431 07457 08944 10400* 10503*
EXCRETION.BILE
01074* 01075* 01077* 01965* 01967* 02858* 03829* 04235*
04657 04659 07332* 07705* 07788* 09912* 10807*
EXCRETION.BILIARY TRACT
00221 00229 01957* 01966* 02843* 03495* 05559
EXCRETION.COPPER
07025 09634*
EXCRETION.ELECTROLYTE
08018* 09560 10101* 10103* 10345* 10504*
EXCRETION.LIVER AMMONIA
00220 00669 02444* 05147* 05282 07329* 07847* 08225*
09661 10553* 10701
EXCRETION.STEROID
09579
EXFOLIATIVE CYTOLOGY
02717 09263 10199* 10205 10206
EXPERIMENTAL CIRRHOSIS
00747 01093* 01614 04391* 06143* 06192* 07038* 07898*
08235* 09168 10074*
EXPERIMENTAL ESOPHAGITIS
00373
EXPERIMENTAL GASTRITIS
00419 03048* 03081
EXPERIMENTAL HEPATITIS
00701* 01594 02520 02552 04293 04332 05222* 06143*
06156 07061 07083 07909* 10057* 10075* 10682*
EXPERIMENTAL PANCREATITIS
00178* 00639* 00641* 00642* 00646 01468* 01469* 03334
04235* 04236* 04241* 04242* 04252 05122* 05126 06034*
06036* 06050* 06054 06430 07807* 08740* 08741* 09627
10540
EXPERIMENTAL PERITONITIS
08013*
EXPERIMENTAL STUDIES OF LIVER
00192* 00211 01533 01625* 02046 06065*
EXPERIMENTAL SURGICAL TECHNIQUES
00243 04292* 04686* 05158* 05182 05185 05898 06061*
06068* 06190* 06304* 06416* 06928* 07373 07821* 07845*
08077* 09183* 09184* 09188* 10041*
EXPERIMENTAL ULCERS
00434* 00437* 00438* 00440* 00487 00495 00501 01328*
01329* 01330* 01345* 01348* 01349* 01350* 02282 02283
02405* 03059* 03967* 03968* 04852* 04853* 04864 05768*
05825* 05826* 05828* 05829* 06608* 06618* 06619* 06702

EXPERIMENTAL ULCERS
CONTINUED
10266* 10280* 10297

FAMILIAL DISEASES
00362* 00532 00575* 00576* 00731* 00755 00767* 01422*
01458* 01495* 01496* 01553 01554 01656* 01720 02433*
02664 04120* 05033 05054 05066 06094 06164* 06267
06836* 06960* 07483* 07874 08752* 08753* 08757* 08760*
08939* 08947 09450 09510* 09693 09865 10367 10401*
10499* 10846 10848
FAT ABSORPTION
00045* 00056* 00264* 00978 01298* 01362 03623* 03625*
03645* 03793* 04917* 04979 05338* 06216* 06345* 06541*
06827 06947 07705* 07954* 08616* 08960 09929*
FAT METABOLISM
00066*
FATS
SEE ALSO DIGESTION
SEE ALSO LIPID ABSORPTION
SEE ALSO LIPIDS
SEE ALSO LIVER LIPID METABOLISM
SEE ALSO MALABSORPTION
00104 01163 02003
FATTY ACID ABSORPTION
00050* 00081 00958* 00959* 01840* 03654 03655 07240*
07254* 08117* 08629 09028* 10858*
FATTY ACID METABOLISM
00978 01100 01124 01990 02078 03790 05214* 05560
05585 05609* 05934 06292 07255*
FATTY ACID SYNTHESIS
01762 01964* 02000 05423 05424 05582 07375
FATTY ACIDS
00066* 00096* 00829* 01019* 01053* 01125 01127 01128
01129 01413 01665* 01998 01999 02001 02002 05542*
10112*
FATTY LIVER
00272* 00656* 00659* 00697* 00756 01490* 01537 01539
01540 01541 01542 01543 01564 01600* 01606* 01619
01657* 02427* 02435* 02469 02475 02503 03338* 03340*
03406* 03456* 04331* 04401 04404 04405 04698* 05113
05143* 05150* 05188 05191 05198 05214* 05215* 05272*
05278 06076* 06147 06200 06445* 06960* 06961* 07032
07042* 07096 07317* 07345* 07346* 07367 07841* 07856
07861 07877 07894* 08227* 08273 08277 08774 09128*
09133* 09135* 09137* 09201* 09636* 09643* 09718 09894*
10042* 10051* 10072* 10560* 10564* 10598 10635 10659
10676*
FECES
00261* 01207* 02185 05001 05338* 05614 05688 05988
06002 06003 06261* 06280 06877 07757 08316 08714
09579 09840* 09858 10109 10133* 10487 10709 10807*
FIBROSIS
01489* 03870* 08038 08972 10381 10764* 10852
FIBROSIS.CYSTIC
SEE ALSO MUCOVISCIDOSIS
06754 07795* 07797 07803 07866
FIBROSIS.LIVER
00656* 00660* 01488* 01551 01620 04260* 04313 06062*
07862 07866 10618 10714* 10745 10861
FISSURES.ANUS
02393 06870 08647* 10494
FISTULAS.ANORECTAL
09549
FISTULAS.ANUS
00588 01443 01444 03219* 04192 09533
FISTULAS.BILIARY TRACT
00766* 00801 00802 03522 03645* 04430 07131 07522
08491 08898 09716* 09803* 09838
FISTULAS.COLON
09477
FISTULAS.DUODENUM
07522 08491 08665 08966 09477 09838 10509*
FISTULAS.ESOPHAGUS
00368 00369 00370 02202 04731* 04739 04753 05723*
07542* 07548 08342 08382 09250 10183
FISTULAS.GALLBLADDER
05303 05316 05971 08898 10764
FISTULAS.GASTROINTESTINAL
00472 00525 01699 02623 03060* 04430 05358 05864*
06731 07160 07697* 08048 08464 08966
FISTULAS.LARGE INTESTINE
03230 03543 03946 03946 04172 04181 05115 05971
06006 06885 06886 06887 08654* 08665 08700 09395
09511* 10436*
FISTULAS.LIVER
08829* 08874
FISTULAS.PANCREAS
00190 05102 08731
FISTULAS.RECTUM
00588 06845 06896 10435*
FISTULAS.SMALL INTESTINE
01372 03157 04068 04920 04956 05864* 05876 06809
07131 07664

FISTULAS,STOMACH
03946 06572 08029 08456 09395
FOLIC ACID
02481 02609* 03189* 04365 06299 06819*
FOLIC ACID ABSORPTION
00049* 00054* 00951* 00952* 00975 00976 01855 05440*
05441* 05454* 06349* 10403*
FOLIC ACID IN MALABSORPTION TREATMENT
10389*
FOREIGN BODIES IN BILIARY TRACT
00030 04715 05331 08886*
FOREIGN BODIES IN DUODENUM
01378 09846*
FOREIGN BODIES IN ESOPHAGUS
00379 01279 02196 03882 05737 09265
FOREIGN BODIES IN GASTROINTESTINAL TRACT
00873 01502 08035 08050
FOREIGN BODIES IN LARGE INTESTINE
02367 07755
FOREIGN BODIES IN SMALL INTESTINE
03159 03167 04049 06782
FOREIGN BODIES IN STOMACH
00409 03093 05781 09846*
FREEZING TREATMENT
07224 10679
FREEZING TREATMENT OF PEPTIC ULCERS
06730
FRUCTOSE
08631 08752* 08802
FRUCTOSE ABSORPTION
00057* 04986 07239* 07249* 07251* 09913* 09914*
FUNGUS DISEASES
03571 05020* 05134 05943* 08952 09321

GALACTOSE ABSORPTION
00046* 04987 04993 04997 05443* 08118* 10413*
GALLBLADDER
SEE ALSO BILIARY TRACT
SEE ALSO CHOLECYSTITIS
SEE ALSO CHOLELITHIASIS
07467 09822
GALLBLADDER ABSORPTION
02732* 02733* 02838* 03653 03658 04537* 06217* 07982*
08128*
GALLBLADDER ANOMALIES
00323 00819 00822 02603 05323 06227 07125 07127
07983* 08591 08710 09829 09834 10758* 10798
GALLBLADDER BIOCHEMISTRY
00761* 02713* 02838*
GALLBLADDER CANCER
03507 03514 03516 03536 04414* 04428 04435 05287*
05300 05305 05317 05325 06209* 06240 07115 08907
08918 08923
GALLBLADDER CIRCULATION
01831 02728 06377* 10118*
GALLBLADDER CYSTS
03543 07128 07983*
GALLBLADDER DEVELOPMENT
07983*
GALLBLADDER DIAGNOSIS
00330 00332 00338 01254 01256 01261 01643 02165
02166 02167 02170 02171 02939 02978 03853 05292*
05297* 05311 05316 05650* 05652* 05653* 05660* 05708
05710 07103* 07132 07491* 08292* 08318 08928 08930
09836
GALLBLADDER DISEASE DIAGNOSIS
00783 02579* 04417*
GALLBLADDER DISEASE EPIDEMIOLOGY
06209* 06210* 06219*
GALLBLADDER DISEASE ETIOLOGY
04414*
GALLBLADDER DISEASE TREATMENT
02579*
GALLBLADDER DISEASES
01627 02592 02939 03509 04451 05154* 05308 05309
05653* 06211* 06219* 06243 06247 07114* 07133 07851
07993 08004 08930 09833 10716* 10778
GALLBLADDER FISTULAS
05303 05316 05971 08898 10784
GALLBLADDER HISTOLOGY
03509
GALLBLADDER IN CHILDREN
04417* 06219* 08921
GALLBLADDER INJURIES
06217*
GALLBLADDER MORPHOLOGY
00030 01831 02713* 02728 02765* 06215* 06220*
GALLBLADDER MOTILITY
00089* 01865* 02762* 02778 02967 03186* 04563* 04576*
06377* 06378* 10795
GALLBLADDER MUCOSA
00031 07339* 09805*
GALLBLADDER NEOPLASMS
01628 01629 01629 02589 08904 08925
GALLBLADDER NEOPLASMS,BENIGN
04451 05332 07141 08892 10800
GALLBLADDER NEOPLASMS,MALIGNANT
00332 00612* 00762* 00778 00779 07144 07972* 08001
08006 08890 08914 09800* 10786
GALLBLADDER PATHOLOGY
00807 06230
GALLBLADDER PERFORATION
02577* 04436 10775
GALLBLADDER POLYPS
01628
GALLBLADDER RADIOLOGY
SEE ALSO GALLBLADDER DISEASE DIAGNOSIS
00336 00337 00786 00824 01253 01256 01261 01643
02106* 02169 02939 02963 02967 03532 03544 03841
03853 03858 04417* 04428 04446 04454 05297* 05311
05660* 05708 05710 06222* 06534* 08004 08892 08915
10790
GALLBLADDER SECRETION
01363 01958* 02578* 02596 07339* 09805*
GALLBLADDER SURGERY
00760* 00783 00785 00786 00787 00788 00789 01644
02365 02577* 02579* 02762* 03094 03501 03508 03529
03530 04426 04434 04437 04443 04449 04450 04454
05326 05596 06208* 06209* 06219* 06223* 06235 06238
06241 07119 07141 08003 08911 08912 10780 10784
GALLBLADDER TRAUMA
07123
GALLBLADDER TREATMENT
02571* 05320
GALLBLADDER ULTRASTRUCTURE
00775*
GALLBLADDER VOLVULUS
00820 08920
GALLBLADDER,AGE EFFECTS ON
04434 09000*
GALLBLADDER,DISEASES ASSOCIATED WITH
01627 02209 06247
GALLBLADDER,DRUG EFFECTS ON
01958* 02576* 02596 04576* 06377*
GALLBLADDER,DRUG TREATMENT OF
02571* 03506 03532 03533 06212*
GALLBLADDER,HORMONAL CONTROL OF
01958* 02266* 06377* 07104*
GALLBLADDER,NERVOUS CONTROL OF
00815 01831 02266* 08901
GANGRENE
00600 00601 07727* 08041
GARDNERS SYNDROME
06897 07668 09515* 09799* 10429* 10452
GAS
00254 00593 01715 01716 01717 02086* 04106* 05152*
06222* 06514* 10132
GASTRECTOMY
SEE ALSO MALABSORPTION
SEE ALSO MALIGNANT STOMACH NEOPLASMS
00259* 00392* 00430 01338* 01362 02046 02276 03090
03112 03908* 03925 03926 04831 04857* 06388 06613*
06635 06636 06663 06665 06721 06784 07268* 07296*
07558 07591 07594 07669 07796 08399 08406 08409
08426 08433 08506 08511 08931 08960 09356 09415
09547 09847* 09927* 10349 10522
GASTRECTOMY COMPLICATION TREATMENT
08409 09331 10284*
GASTRECTOMY COMPLICATIONS
00256* 00431 00446* 00453* 00481 00562 01298* 03061*
03067 03124* 03195 03903* 03917 03930 03937 03939
03944 03955 03963 03964 03983 04001 04003 04117*
04770* 04773* 04776* 04846* 04847* 04854* 04973* 05125
05130 05299 05771* 05792 05794 05796 05797 05822*
05823* 05824* 05830* 05831* 05843 05844 06683* 06723
07609 08460 08461 08463 08464 08465 08529* 09332
09371 09464 09503 10241 10257 10787
GASTRECTOMY TECHNIQUES
10212 10263
GASTRECTOMY-INDUCED AFFERENT LOOP SYNDROME
00256* 00456* 00482 01339* 01392* 02221* 03955 06654
10284*
GASTRECTOMY-INDUCED ANEMIA
08413 08503
GASTRECTOMY-INDUCED BONE DISEASES
01683* 02268* 06611* 10117*
GASTRECTOMY-INDUCED DUMPING SYNDROME
00256* 01339* 01340* 01341* 02267* 04773* 04846* 04854*
05827* 06617* 08503 08512 09331 10210 10284*
GASTRECTOMY-INDUCED MALABSORPTION
02268* 07626* 07720 08932* 10414*
GASTRECTOMY-INDUCED METABOLIC CHANGES
06615* 06670 10301
GASTRECTOMY-INDUCED RECURRENT ULCER
04860* 07624* 08503
GASTRECTOMY,CLINICAL RESULTS OF
02221* 02234 02235 08503 09331 10212 10231 10234
10272*

GASTRECTOMY,DISEASES ASSOCIATED WITH
00381 05764* 06683* 07993 09371
GASTRIC ANALYSIS
07285* 09231 09232
GASTRIC ANALYSIS IN STOMACH DIAGNOSIS
08173* 09374 10141 10223
GASTRIC ANALYSIS TECHNIQUES
SEE ALSO HEIDENHAIN POUCH STUDIES
07299 08196 09215
GASTRIC PARIETAL-CELL ANTIBODY
06609* 08390* 10200* 10220
GASTRIN
00087* 00152* 00163 00166 00300 00848 01011* 01028*
01037 01038 01048 01061 01176* 01177* 01337* 01343*
01653* 01654* 01909* 02222* 02716* 02756* 02786* 02787*
02788* 02809 03046* 03629* 03698* 03699* 03716* 03717*
03725 03762* 04464 04581* 04598* 04606* 04729* 05529*
06259* 06306* 07287* 08116* 08163* 08169* 08175* 08177*
08182* 08183* 08184* 08477* 08481* 08502 08976 09059*
09074* 09847* 09848* 09961* 09969* 09981* 09989* 10258
10275* 10809*
GASTRITIS
00394* 00417 00427 01301* 01318 01319 02247 02248
02684 03046* 03062 03087 03553 03914 03941 03953
04776* 06638 06648 06659 06699* 07621* 08389* 08395*
08416 08418 08466 08471 08518 09289* 09293* 09294*
09295* 09296* 09309 09318 09349 09375 09405 10209
10240 10255 10259 10289
GASTRITIS DIAGNOSIS
00292 03940 05671 05783 08291* 08412 08457
GASTRITIS EPIDEMIOLOGY
07582
GASTRITIS ETIOLOGY
04820 05793 07579* 07582 09290*
GASTRITIS PATHOLOGY
03904* 04771* 04781* 04796 05763* 05784 05802 05817
05893 08417 09317
GASTRITIS TREATMENT
03591 03938 07579* 08468 09312 09342
GASTRITIS,ATROPHIC
00394* 00419 00420 00421 00422 00423 00441* 00466
01317 01320 03048* 03915 05763* 06610* 07582 07584*
08403 08480* 09295* 09301* 09303* 09351 09364 09370
10200* 10203* 10258
GASTRITIS,CHRONIC
04796 04815 07598
GASTRITIS,DISEASES ASSOCIATED WITH
00418 02244 02245 06638 10209
GASTRITIS,EXPERIMENTAL
00419 03048* 03081
GASTRODUODENAL ULCERS
06705 06710 06711 06718 07636 08493 08495 08508
09384 09401 10289 10294 10320
GASTRODUODENITIS
01354
GASTROENTERITIS
SEE ALSO COLITIS
SEE ALSO ENTERITIS
SEE ALSO ENTEROCOLITIS
02315 03591 04486 05129 05344 10836
GASTROENTERITIS EPIDEMIOLOGY
02682 03803*
GASTROENTERITIS ETIOLOGY
00535 01681* 02606* 05345 05354 05355 06261* 09853
GASTROENTERITIS IN CHILDREN
04483 05352 06261* 08017* 08018* 08019*
GASTROENTERITIS TREATMENT
02606* 02686 04483 05354 08018* 08019*
GASTROENTEROSTOMY
00455* 07606 09341 09366 09382* 10201* 10738*
GASTROINTESTINAL ABSORPTION
00072 00074 00242 00363* 00563 00639* 00949* 00955*
00960 00970 00974 01765 01837* 01848 01850 01851
01853 01856 01857 01858 02064 02627 02739* 02740*
02749 02904* 03179 04608* 09927*
GASTROINTESTINAL ANGIOGRAPHY
01723 02950 02975 06549 07156* 07515 09225 09460
10135*
GASTROINTESTINAL ANOMALIES
00368 02657 02658 02673 03592 05356 05357 05359
05360 06263* 06269 07170
GASTROINTESTINAL BIOCHEMISTRY
00016* 00242 00936 01178* 01190
GASTROINTESTINAL BIOPOTENTIALS
07269* 07281* 07476* 08138* 08139* 08146 08148 09039*
09068* 09181* 09932* 09941 09944* 09947* 09950* 09955*
09957* 09964
GASTROINTESTINAL BIOPSY
00343 00344 08052
GASTROINTESTINAL BLEEDING
00245 00355 00393* 00394* 00395* 00422 00429 00432*
00453* 00499 00602 00603 00604 00608* 00676 00682
00856 00857 00858 00859 01266 01267 01374 01480
01488* 01646* 01648* 01649* 01695 01706 01732 01735
02110 02174 02214* 02612* 02613* 02623 02624 02656
02665 02666 02667 02950 02975 03056* 03087 03135
GASTROINTESTINAL BLEEDING
CONTINUED
03176 03210* 03318 03463* 03518 03549 03552 03553
03557 03589 03849 03878 03906* 03916 03921 03947
03971* 03989 04014 04014 04146 04253 04399 04462*
04484 04489 04489 04492 04792 04802 04807 04820
04825 04838 04857* 04868 04915* 04932 04944 04950
05021* 05039 05068 05279 05379 05388 05774* 05782
06079 06274 06279 06549 06569* 06599 06613* 06658
06748 06749 06841* 06890 06895 07138 07156* 07161
07171 07179 07187 07493* 07545 07579* 07580* 07581*
07597 07607 07613 07629 07637 07662 07691 07808*
08021* 08059 08072 08309 08312 08320 08366 08407
08421 08568 08646* 08664 08699 08715 08822 08929
08934* 08957 08959 08970 09207* 09217 09291* 09305
09307 09361 09363 09460 09587 09668 09839* 09862
09866 09874 10151 10161* 10251 10255 10260 10262
10268* 10475 10570* 10616 10667 10734* 10806* 10816*
10817* 10828 10830 10835 10846 10855
GASTROINTESTINAL CALCULI
08530*
GASTROINTESTINAL CANCER
02611* 02646 02648 02662 02969 02989 03352* 03556
03559 03590 04461* 04493 04495 04496 05334* 05371
05372 05643* 06666 07157 08302 09860 10813*
GASTROINTESTINAL CARCINOGENESIS
02969
GASTROINTESTINAL CIRCULATION
00244 00251 00540* 00834 00937 01169* 01170* 01182
01694 01733 01819 02080* 02083* 02085* 02093 02104*
02622 02685 02690 02905* 02907* 02975 03555 03816*
03817* 03820 03821 04462* 04471 04686* 04915* 05386
06453* 08947
GASTROINTESTINAL CIRCULATION STUDY TECHNIQUES
01171* 01183
GASTROINTESTINAL COMPLICATIONS
02627 02632 02663 03565 05393 10824 10825 10843
GASTROINTESTINAL CYSTS
00375 00806 00895 00896 02941 05356 10826
GASTROINTESTINAL DEVELOPMENT
01186 05630
GASTROINTESTINAL DIAGNOSIS
00258* 00280 00343 00344 00345 00346 00354 00355
00843 00851 00869 01230 01250 01263 01264 01265
01266 01268 02104* 02172 02173 02174 02181 02183
02950 02969 02972 02975 02979 03855 04490 04493
04495 04496 04709 04711 04719 05335* 05361 05377
05391 05627* 05643* 05660* 05667 05712 05713 05714
05715 05716 05717 05719 06550 06595 06606* 07148*
07189 07497 08150 08316 08322 10009* 10133*
GASTROINTESTINAL DISEASE
02605*
GASTROINTESTINAL DISEASE EPIDEMIOLOGY
00851 00868 01767 01768 02661 06275 06276 06284
08027 10238
GASTROINTESTINAL DISEASE ETIOLOGY
01773 02612* 02626 02643 03581 05367 05368 05386
06258* 07155*
GASTROINTESTINAL DISEASES
00850 00860 00876 01686 01691 01712 01713 01760
01763 01779 01780 01792 02605* 02609* 02615* 02631
02641 02645 02647 02653 03551 03564 03567 03572
03582 03585 03593 04469 04470 04481 04487 04488
04490 05183 05335* 05361 05367 05374 05377 05387
06260* 06270 06276 06283 06285 06297 06802 07159
07210* 07278 08012* 08039 08053 08056 08324 08487*
08795 08936* 08967 08971 08979 09225 09234 09328
09868 09878 10185 10265 10819 10820 10833 10842
10854
GASTROINTESTINAL DISEASES IN CHILDREN
00845 01657* 02611* 02649 02651 02654 02663 02672
02673 02676 03204 03287* 03578 03592 05384 06278
07160
GASTROINTESTINAL DIVERTICULA
09862
GASTROINTESTINAL ENDOSCOPY
00344 00348 07486* 08304 09207* 10847
GASTROINTESTINAL ENZYMES
00787 01190 01362 01856 02065 02075 02909* 05604*
09057 09177
GASTROINTESTINAL FISTULAS
00472 00525 01699 02623 03060* 04430 05358 05864*
06731 07160 07697* 08048 08464 08966
GASTROINTESTINAL FUNCTION
00352 00410 00541* 02904* 04470
GASTROINTESTINAL HISTOLOGY
00215 00234 00923 01296* 02910* 04495 08086* 08094
08142* 09005 09013
GASTROINTESTINAL IMMUNOLOGY
00265* 01654* 01849 02648 02669 02675 02783* 02906*
02969 02989 03290* 03576 03600 04461* 04498 08017*
08560 10859*
GASTROINTESTINAL INJURIES
01682* 05382 05393

GASTROINTESTINAL LYMPHOGRAPHY
08301
GASTROINTESTINAL METABOLISM
01166 01176* 02061 02066 02067 02070 02075 02076
02078 02083* 02092 02629 04482 07464 10113*
GASTROINTESTINAL MICROORGANISMS
00234 01167 01168 01185 01679* 01777 01778 02072
02073 02086* 02332* 02610* 02643 02644 02661 02676
02683 02686 02909* 03555 03571 03581 03583 04486
04494 05129 05344 05345 05608* 06256* 06266 06275
06287 06288 08027 08045 08285* 08288 09297* 10112*
10123* 10738*
GASTROINTESTINAL MORPHOLOGY
00001* 00032 00241* 00935 00938 01811 01819 02646
02730 02910* 05433 06720 07190 07206* 08052 08091
GASTROINTESTINAL MOTILITY
00074 00107 00117 00119 00120 00121 00247 00531
00985* 01007 01659* 01870* 01871* 01872* 01882 01884
01895 01896 01897 01898 01900 01901 02287* 02628
02640 02761* 02779 02780 02904* 03595 03685 03691
04581* 04608* 04817 05474 06391 06392 07206* 07275
07276 08030 08150 09047 09578 09840* 09959*
GASTROINTESTINAL MUCOSA
00010* 00234 01811 01846 01849 01850 02907* 03600
04498 06305* 08091 09013 10826
GASTROINTESTINAL NEOPLASMS
00689 00843 00844 01731 08948
GASTROINTESTINAL NEOPLASMS,BENIGN
01728
GASTROINTESTINAL NEOPLASMS,MALIGNANT
00577 00845 01296* 01721 01722 01726 01727 01729
01730 01733 02218* 02377 06527* 06639 07693 08955
08956 09228 09230 10489 10834
GASTROINTESTINAL NEOPLASMS,VILLOUS
08594
GASTROINTESTINAL OBSTRUCTION
00387 00533 00834 00836 00852 01224 02104* 02625
02972 04456* 06263*
GASTROINTESTINAL PATHOLOGY
00691 00849 00850 02605* 02626 08032
GASTROINTESTINAL PERFORATION
00873 01502 02313 02392 05359 06277 06278 06281
06295 07175 07181 08029 08532 08949
GASTROINTESTINAL PERFUSION
05391
GASTROINTESTINAL POLYPS
03177 03178 05886 10847
GASTROINTESTINAL RADIOLOGY
SEE ALSO GASTROINTESTINAL DIAGNOSIS
00107 00345 00346 00347 00851 00859 01267 01277
01710 01714 02168 02173 02175 02180 02183 02317
02941 02944 02972 04093 04490 04493 04709 04711
05660* 05667 05713 06527* 06546 06744* 07527 08032
08302 08325 08331 09230 09283 09855 10381 10816*
GASTROINTESTINAL SECRETION
00167 00887 01177* 01178* 01188 01189 01199* 02657
02658 02783* 02784 02904* 04594 06418 07461 08159
GASTROINTESTINAL STRICTURE
01700
GASTROINTESTINAL SURGERY
SEE ALSO GASTROINTESTINAL TREATMENT
00685 00853 00891* 01675* 01677* 01699 01703 01731
01732 01733 01734 02611* 02616* 02632 02636 02656
02665 02670 02681 03060* 03176 03287* 03558 03563
03564 03583 03593 03842 04812 05183 05370 05385
05389 06263* 06740* 06792 06934 06940 08021* 08048
08050 08945 08984 09848* 09876 10110 10185 10195*
10373
GASTROINTESTINAL TRACT
00254 10132
GASTROINTESTINAL TRACT DEVELOPMENT
07170 08085* 09177 10823
GASTROINTESTINAL TRACT IN CHILDREN
00937 01224 01265 01404 01657 01872* 01873* 04490
07175 07527 08030 08324 08325 08949 09047 09461
09862 10198* 10340* 10854
GASTROINTESTINAL TRACT,AGE EFFECTS ON
00074 00875 00876 02631 02681 06277 08135 08945
08946 10112*
GASTROINTESTINAL TRACT,DISEASES ASSOCIATED WITH
00844 01708 01718 01745 02216* 02624 02628 03551
07178 08032 08933* 08954 10819 10820
GASTROINTESTINAL TRACT,DRUG EFFECTS ON
00831* 00860 00861 00965 00991* 01409 01648* 01735
01737 01743 01901 02062 02079* 02080* 02081* 02180
02216* 02761* 02907* 03553 03589 03710* 03813 03816*
05353 05362 06264 06272 07166 07607 09839* 10830
GASTROINTESTINAL TRACT,DRUG TREATMENT OF
00534 00539* 00831* 00862 00863 00864 00865 00866
00867 00898 01321 01355 01649* 01677* 01684* 01735
01736 01739 01740 01741 01742 01744 01745 01746
01747 01748 01749 01750 01751 01752 01753 01754
01755 01781 01786 01788 02365 02613* 02616* 02617*
02635 02637 02638 02639 02640 02642 02645 02659
02660 02672 03591 03595 04014 04483 05347 05374
06257* 06273 10839
GASTROINTESTINAL TRACT,ELECTROLYTE METABOLISM IN
06356 10833
GASTROINTESTINAL TRACT,ENZYME TREATMENT OF
08474 10837
GASTROINTESTINAL TRACT,FOREIGN BODIES IN
00873 01502 08035 08050
GASTROINTESTINAL TRACT,HORMONAL CONTROL OF
00245 00249 01888 01927 02077 02626 04467 10100*
GASTROINTESTINAL TRACT,HORMONAL TREATMENT OF
10278*
GASTROINTESTINAL TRACT,NERVOUS CONTROL OF
00921 00938 01007 01008 01899 02641 05474 07206*
08142* 09038* 09040
GASTROINTESTINAL TRACT,TOXIC EFFECTS ON
01770 03565 03879 04482 05344 05345 05607* 06264
06272 07040* 07166 10156 10830
GASTROINTESTINAL TRAUMA
01364 01687 02605* 03573 03879 04016* 04468 05382
05393
GASTROINTESTINAL TREATMENT
SEE ALSO GASTROINTESTINAL SURGERY
02613* 02637 02655 02659 03585 04470 04484 05389
08941* 09854 10833
GASTROINTESTINAL ULCERS
02612* 03557 03906* 10824
GASTROINTESTINAL ULTRASTRUCTURE
07215 07464 07578* 08094
GASTROINTESTINAL WATER METABOLISM
06355 08114* 08124* 08940* 09200* 09560 10804*
GASTROSCOPY
SEE ALSO STOMACH ENDOSCOPY
04718 06525* 06607* 06685* 06694* 07179 07593 08298
08308 08313 08319 08420 08466 09208* 09222 09313
09368 10242 10254 10256 10281* 10564*
GASTROSTOMY
00378 04809 04812 08392* 09426* 10355
GENETIC RELATIONSHIPS
SEE ALSO FAMILIAL DISEASES
01342* 01411 01449 01491* 01652* 01832* 02205 02433*
03177 03310 03354* 03777 04011 04083* 04173 04203*
05138* 05156* 05357 05369 05387 05431 05758 05765*
06165* 06614* 07155* 07209* 08154* 08391* 08555 08620*
08631 09078* 10200* 10501* 10554*
GENETIC RELATIONSHIPS,BLOOD GROUP
07155*
GIARDIASIS
01784* 01793 02331* 03599 10859*
GILBERTS DISEASE
00655* 08811 09227
GLUCAGON
00181 01020* 01162 01960* 01961* 02823* 02830 03698*
03815 03816* 04255 04464 04628* 04685 05579 05598
06404* 06515 06615* 07318* 08193 08223* 08519* 09037*
09041 09094 09173* 09186* 10001* 10024* 10101* 10107
10344* 10731*
GLUCONEOGENESIS
00216 01101 01103 01104 01105 01498* 01576* 06489
07374 07447 08252
GLUCOSE
00104 00181 02080* 02823* 02908* 06403* 09970*
GLUCOSE ABSORPTION
00047* 00048* 00944* 00964 00965 01159* 01669* 01843*
01844* 01851 02061 02062 02738* 03624* 03631* 04542*
04977* 04987 04993 05437* 05443* 05444* 05445* 05446*
05554* 06191* 06343* 06364 07238* 07239* 07321* 08116*
09026* 09913* 09914* 10413*
GLUCOSE METABOLISM
00492 01164 01607* 01660* 06615* 07239* 07321* 07964
08522* 08861 09913* 09914* 10051* 10119* 10519
GLUCOSE METABOLISM,LIVER
00213 01984 01994 01997 02012 02490* 02502 02568
02847* 02853* 02857* 02888* 04649* 06191* 06489 06491
06518* 07357 08216* 10024* 10063*
GLYCOGEN
01284 05535 05562 05856
GLYCOGEN METABOLISM,LIVER
01498* 01576* 01952* 01988 01989 02019 02477 02880
03341* 05196 05552* 05562 06485 07387 07445 09139
GLYCOGEN STORAGE DISEASE
01538 03341* 04287 05196 06140 06995 08756* 10103*
GLYCOGEN,LIVER
00195* 01102 02725 02846* 02847* 02857* 04287 04524
05176 05538* 05554* 06140 08103 08260 08752* 09125*
09892* 10033*
GLYCOPROTEINS
00010* 00012* 00013* 01305 02893* 05492* 06411* 06618*
07343* 07459 07472* 07585* 07865 08153* 09987*
GNOTOBIOSIS
07168 07454* 07459 07847* 09897 09972* 10109 10112*
10113* 10123* 10670
GRANULOMA
00400 00678 02322*
GRANULOMATOUS COLITIS
SEE ALSO CROHNS DISEASE OF COLON

GRANULOMATOUS COLITIS
CONTINUED
03286*
GRAVITATIONAL STRESS
00126
GREATER OMENTUM
01696 07688

HAMARTOMA
07007 07156* 10620
HEALING,WOUND
01417* 01418* 03931 05861* 08057 09522* 10116* 10202*
10428*
HEIDENHAIN POUCH STUDIES
07271* 07287* 07291* 08164*
HEMANGIOMA
01728 04136 04177 07504 07876 07382 08376 08599
08797 10233 10333* 10602
HEMATEMESIS
00374 00455* 00858 02204 03946* 08965 09326 09423*
10238
HEMATOMA
05754 05896 06753 06992 07020 07676 07677 07678
07899* 07900* 08545 08715 10378 10647
HEMOBILIA
SEE ALSO BILIARY TRACT
00818 06994 08923 10777
HEMOCHROMATOSIS
00692 00830* 02178 02290* 06073* 09122* 09992* 10575*
HEMODIALYSIS
01941* 07039* 07068
HEMOGLOBIN METABOLISM
01581* 10536*
HEMOLYTIC ANEMIA
01652* 04208* 07044 07856 08878 09340 09604 10123*
10623 10724
HEMORRHAGE
SEE ALSO BLEEDING
01505 02612* 02613* 03321 07559 08333* 08421 08796
08957 09294* 09859 09866
HEMORRHAGIC PANCREATITIS
00640* 00642* 01475 02422* 04244 04700* 06949* 08741*
08746 09621* 10531* 10532* 10535* 10538*
HEMORRHOIDS
00605 03220* 05962 09514*
HEMOSIDEROSIS
00686 03630* 06739*
HEPATECTOMY
SEE ALSO LIVER REGENERATION
00199* 00200* 00202* 00203* 00204* 00205* 00207* 00210
00212 00435* 01050* 01088* 01090* 01091* 01092* 01149
01483* 01976* 01977* 02087* 02509 05556* 05587 06313*
06459* 06468 06511* 07316* 07323* 07362 07415 07873
08263 10025* 10031* 10595 10603 10658 10671* 10678
HEPATIC COMA
SEE ALSO LIVER COMA
02434* 02480
HEPATIC ENCEPHALOPATHY
00666 00741* 01504 02082* 02563* 02564* 04292* 04405
06077 06088 06129 06185* 06186* 07841* 07842* 07847*
08779 09661 09665 09678 09700 10161* 10553* 10637
10670 10675* 10692* 10725* 10727* 10738* 10743
HEPATIC VEIN THROMBOSIS
SEE ALSO BUDD-CHIARI SYNDROME
10558* 10666
HEPATITIS
SEE ALSO JAUNDICE
SEE ALSO LIVER
SEE ALSO LIVER COMA
02427* 02433* 02441* 02502 02505 02519 02615* 03342*
03386 03392 03410 03456* 03513 03557 03570 04069*
04332 04333 04334 05193 06136 06171 06987 07018
07044 07045 08841 09890
HEPATITIS COMPLICATIONS
02554* 03389 03466 08835 10717*
HEPATITIS COMPLICATIONS,VIRAL
00706* 02526 02531 02535 03444 03446 04356 05237
05251 07053* 07840* 07936 08862 09724* 09741 09746
09773 10708
HEPATITIS DIAGNOSIS
01202* 02151 03407* 04379* 04691* 04703* 05254* 05657*
05659* 06168* 06555 06981 07049* 07514 09670 09802*
10563*
HEPATITIS DIAGNOSIS,VIRAL
00329 01249 02532 03425* 03435 03439 03447* 04345*
04353 04361 04368 05148* 05220* 05240 05245 05252
06556 07484* 07934 08859 09763
HEPATITIS EPIDEMIOLOGY
00729* 01582 01596 02537 02539 04330* 07912* 07948*
09728* 09732* 09738 09739 10707
HEPATITIS EPIDEMIOLOGY,VIRAL
01573* 01574* 01583 02521 02547 02549 03428 03431
03437 04346* 04351 04367 04371 04374 05221* 05223*
05228 05231 05232 05238 05242 05248 05249 05250
06164* 06167* 06170 06175 06179 07165 07910* 07917*
07921* 07938 07940 08844* 08858 09727* 09730* 09734*
HEPATITIS EPIDEMIOLOGY,VIRAL
CONTINUED
09743 09755 09762 10681* 10699 10711 10718
HEPATITIS EPIDEMIOLOGY,VIRUS
09753
HEPATITIS ETIOLOGY
00652* 01578* 02518 02519 03447* 04377* 05230 05659*
06148 06158 08857
HEPATITIS ETIOLOGY,VIRAL
00716 02515* 02521 02529 03423* 03424* 03430* 03431
03432 03438 03441 03443 03445 04341* 04342* 04343*
04344* 04346* 04350 04354 04362 04366 04375 05222*
05233 05235 06163* 06165* 07910* 07918* 08844* 09752
09762 09772 10684*
HEPATITIS IMMUNOLOGY
00711* 00714 00718 00720 00721 00730* 00731* 00732
00734 00735 01202* 01577* 01578* 01579* 01580* 01591
01597* 02518 02540 04377* 04691* 04721 05146* 05221*
05657* 06161* 06555 07049* 07051* 07057 07058 07062
07068 07069 07071 07072 07074 07077 07078 07081
07082 07512 07831* 07924 07925 07926 07927 07928
07931 07937 07942 07943 07944 07945 07948* 07963
08783 08816 08860 08863 08868 09688 09728* 09731*
09732* 09733* 09737 09738 09739 09744 09758 09759
09769 09777* 10555* 10569* 10587* 10664 10683* 10684*
10688* 10690* 10691* 10693* 10694* 10698 10699 10704
10705 10706 10707 10710 10712 10715*
HEPATITIS IMMUNOLOGY,VIRAL
00652* 00715 01574* 01590 01592 01593 01594 02515*
02516* 02523 02524 02525 02528 02529 02530 02532
02533 02536 02538 02541 02543 02544 02546 02550
04341* 04342* 04343* 04344* 04345* 04346* 04347* 04348*
05220* 05224* 05225* 05234 05236 05238 05239 05243
05244 05246 05247 05249 05253 06163* 06164* 06165*
06167* 06169* 06172 06173 06177 06180 06182 07052*
07054* 07064 07065 07080 07907* 07908* 07910* 07912*
07913* 07915* 07916* 07917* 07918* 07919* 07920* 07923
07929 07932 07947 08845* 08847* 09650* 09725* 09727*
09727* 09735* 09742 09750 09751 09752 09753 09760
09768 10057* 10584* 10681* 10682* 10685* 10686* 10687*
10688* 10689* 10696* 10711 10719
HEPATITIS IN CHILDREN
03427* 03448* 03466 05259 05260 07051* 08780 08783
08832 08835 08854 09757 09779
HEPATITIS IN CHILDREN,VIRAL
00706* 00728 01583 02551 03446 04344* 04351 04353
04364 06162* 07075 07919* 07932 08846* 09751 09752
09756 09764 09765 09767 09775
HEPATITIS IN PREGNANCY
02549 07098 07919*
HEPATITIS PATHOLOGY
04324* 04381 05258 06168* 07911* 08869 09636* 10605
HEPATITIS PATHOLOGY,VIRAL
02534 02545 02548 02552 04261* 04347* 04349* 04356
04378* 05222* 05227* 05241 05255* 06123 06162* 06174
06175 07922* 08844* 09729*
HEPATITIS PROPHYLAXIS
06141
HEPATITIS PROPHYLAXIS,VIRAL
05220* 05223* 05229 05234 05242 05246 05248 06179
06180 07921* 08846* 09747 10693* 10695* 10700
HEPATITIS TREATMENT
00722 00733 00735 01598 02514* 03451 05254* 05256*
05260 07084* 07086 07087 07946 08820 09778 10569*
10715* 10720
HEPATITIS TREATMENT,VIRAL
00715 01586 01587 04344* 04359 04364 04370 05223*
05227* 06160* 06166* 06178 06183 06184 07933 08844*
08847* 08855 09740 10680*
HEPATITIS,ACUTE
00724 00725 00727 01566 02494* 03421* 03426* 03429
03434 04327* 04363 04372 04375 04376 04377* 05146*
05218 05225* 05226* 06168* 07054* 07905 07909* 07911*
08856 10692*
HEPATITIS,ACUTE VIRAL
00653* 00707* 00711* 00728 01575* 01576* 01577* 01579*
01583 01588 01593 02512* 02514* 02527 04360 04370
05227* 06175
HEPATITIS,ANICTERIC
07912* 07938 10684* 10695*
HEPATITIS,CHRONIC
00713 00720 00726 00729* 00730* 00731* 00732 00733
00734 00735 00736 01493* 01577* 01597* 01598 01599
02442* 02554* 02555 02556 03449 03450 03457* 03487
04309 04376 04377* 04378* 04379* 04380* 04382 04383
04384 04385 04394* 04698* 05146* 05154* 05225* 05226*
05254* 05255* 05256* 05257 05258 05259 05260 05261
06141 07054* 07081 07084* 07085 07086 07087 07894*
07916* 07948* 07950 07951 08814 08868 08869 08870
08977 09463 09636* 09758 09776* 09778 09779 09894*
10696* 10714* 10716* 10717* 10718 10719 10720 10721
10723 10724
HEPATITIS,CIRCULATION IN
07936 09771

HEPATITIS,CLINICAL STUDIES OF
00717
HEPATITIS,DISEASES ASSOCIATED WITH
00653* 00736 01493* 01580* 01581* 01589 01591 01599
02512* 06161* 07085 08870 09736 10690* 10722
HEPATITIS,DISEASES ASSOCIATED WITH VIRAL
00388 01250 01575* 06174 07053* 07079 07907* 09749
09766 10686* 10687* 10713
HEPATITIS,EXPERIMENTAL
00701* 01554 02520 02552 04293 04332 05222* 06143*
06156 07061 07083 07909* 10057* 10075* 10682*
HEPATITIS,LUPOID
07041*
HEPATITIS,METABOLIC CHANGES IN
07083 07911* 07913* 07914* 07915* 09745 09764 09774
HEPATITIS,SERUM
00709* 00714 00718 00719 00720 00723 01580* 01581*
01596 02521 02537 02539 02540 02549 02553 03420*
03422* 03423* 03425* 03433 03441 03447* 04270* 04330*
04345* 04347* 04348* 04352 04355 04358 04361 04366
04374 04691* 05220* 05221* 05223* 05225* 05228 06167*
06169* 06170 06181 06184 07056 07062 07070 07909*
07910* 07915* 07917* 07918* 07920* 07921* 07930 08851
08861 09732* 09733* 09734* 09757 09768 10685* 10689*
10693* 10695* 10697 10712
HEPATITIS,TOXIC
SEE ALSO TOXIC EFFECTS ON LIVER
00700* 00701* 07047 07841* 08823* 09717* 09722 10633
10672* 10674* 10675*
HEPATITIS,VIRAL
00656* 00709* 00710* 00712* 00713 00717 00721 00726
00729* 01584 01585 01595 02511* 02513* 02516* 02517
02520 02521 02522 02523 02524 02525 02526 02528
02529 02530 02531 02532 02533 02534 02535 02536
02538 02540 02541 02542 02543 02545 02546 02550
02552 02553 03420* 03422* 03423* 03429 03436 03440
03441 03442 04330* 04352 04355 04357 04360 04365
04369 04373 04376 05226* 06176 06181 06443* 07008
07011 07050* 07052* 07053* 07055* 07056 07059 07060
07061 07063 07064 07066 07067 07070 07073 07076
07506 07913* 07914* 07935 07939 07941 07951 08848
08849 08850 08852 08853 08854 08861 08862 09748
09761 09770 09771 09774 10701 10702 10703 10709
10713
HEPATOLENTICULAR DEGENERATION
02432* 02439* 02470
HEPATOMA
02448* 02453 02454 02458 02465 02466 06986 07013
07107* 07316* 07330* 07390 07443 07521 07825* 07873
07881 08786 08801 09649* 10573* 10577* 10583*
HEPATOMEGALY
00670 02486 06312* 06575* 07026 07857 07864 07886
08793 08810
HEPATOSPLENOMEGALY
05404* 06094
HERNIA
SEE ALSO DIAPHRAGM HERNIA
00533 00757 00799 00800 02285* 05878 05879 06793
06882 06884 07551 09271 09459 10245
HERNIA IN CHILDREN
04764
HERNIA,ABDOMEN
01701 03932 06860 08536 08809
HERNIA,DIAPHRAGM
02619* 04764 05727 05732 05733 05734 05738 05741
05760 07539* 08378 08505 09264 09267 09285
HERNIA,DISEASES ASSOCIATED WITH HIATUS
00387 00388 01273*
HERNIA,HIATUS
00364* 00365* 00366* 00377 00385 00386 00387 00388
01194* 01271* 01272* 01275 02109 02186* 02187* 02188*
02189* 02194 02209 02210 02211 02212 02213 02992*
02996* 03003* 03005* 03006* 03011 03013 03014 03017
03022 03025 03026 03027 03030 03031 03042 03870*
03898 04699* 04724* 04727* 04728* 04730* 04738 04741
04751 04756 04762 05720* 05727 05732 05733 05734
05738 05741 05753 05759 05760 06572 06575 06578
06579 06583 06588 06591 06592 06600 06644 07534*
07537* 07545 07556 07557 07559 07565 07566 08024
08332* 08337 08340 08366 08367 08368 08381 09237*
09241* 09246 09247 09251 09252 09253 09262 09267
09277 09282 10158* 10160* 10165* 10181 10184
HERNIA,INGUINAL
06782 07663 08937*
HIATUS HERNIA
00364* 00365* 00366* 00377 00385 00386 00387 00388
01194* 01271* 01272* 01275 02109 02186* 02187* 02188*
02189* 02194 02209 02210 02211 02212 02213 02992*
02996* 03003* 03005* 03006* 03011 03013 03014 03017
03022 03025 03026 03027 03030 03031 03042 03870*
03898 04699* 04724* 04727* 04728* 04730* 04738 04741
04751 04756 04762 05720* 05727 05732 05733 05734
05738 05741 05753 05759 05760 06572 06575 06576
06579 06583 06588 06591 06592 06600 06644 07534*
07537* 07545 07556 07557 07559 07565 07566 08024
08332* 08337 08340 08366 08367 08368 08381 09237*

HIATUS HERNIA
CONTINUED
09241* 09246 09247 09251 09252 09253 09262 09267
09277 09282 10158* 10160* 10165* 10181 10184
HIATUS HERNIA,DISEASES ASSOCIATED WITH
00387 00388 01273*
HIRSCHSPRUNGS DISEASE
00573* 01421* 01422* 02357* 02358* 02359* 02386 03226*
04112* 05049 05073 05080 05081 05384 05978 06005
06015 07739 07754 08713 09509* 09526* 10439* 10440*
10441* 10443* 10464 10480
HISTAMINE
00024 00131* 00132* 00164 00165 00258* 00259* 00299
00300 00302 00427 00448* 00449* 00451* 00485 00727
01019* 01020* 01022* 01046 01048 01173* 01335* 01737
01914* 01919* 01920* 01935* 02252* 02254* 02703* 02756*
02788* 02964 03121* 03129* 03699* 03703* 03706* 03712*
03719 03856 04505* 04603* 04604* 04774* 04874 05488*
05495* 05502* 05504* 05512 05516 05768* 06406* 06408*
06409* 06698* 06734 07282* 07285* 07289* 08170* 08185*
08195 08415 09063* 09064* 09074* 09351 09376* 09378*
09405 09967* 09973* 09975* 09976* 09981* 09983* 09986*
09988* 09989* 09991* 09996 10010* 10269* 10308 10317
10335*
HODGKINS DISEASE
03360 04283 05194 06001 06637 07018 07871 08388*
08718 08773 09458 10566* 10579* 10621
HORMONAL CONTROL OF ABSORPTION
00038* 00086 00952* 00971 09916* 09931*
HORMONAL CONTROL OF BILIARY TRACT
09138*
HORMONAL CONTROL OF CIRCULATION
01175*
HORMONAL CONTROL OF ESOPHAGUS
00087*
HORMONAL CONTROL OF GALLBLADDER
01958* 02266* 06377* 07104*
HORMONAL CONTROL OF GASTROINTESTINAL TRACT
00245 00249 01888 01927 02077 02628 04467 10100*
HORMONAL CONTROL OF LARGE INTESTINE
00069 04107*
HORMONAL CONTROL OF LIVER
01102 01112 01123 01124 01126 01142 01146 01558*
01952* 01960* 01961* 01986 02040 02041 02472 02498
02839* 03743* 03761* 04273* 04387* 04501* 04644* 04666
05138* 05575 06451* 07310* 07318* 07344* 07385 07442
07444 07901* 08213* 08260 09133* 09664 09669 10019*
10024* 10028* 10039* 10090 10100*
HORMONAL CONTROL OF MOTILITY
00097* 00119 01900 06373* 07271*
HORMONAL CONTROL OF PANCREAS
00011* 00176* 00181 00183 00184 00185 00628* 01053*
01054* 01061 01064 01065 01934* 01937* 01938* 01939*
01941* 01945 01946 01948 03735* 03739 04625* 04631*
05533* 06426* 06508* 07286* 07303* 08202* 09092* 09093
09097 09099 10100*
HORMONAL CONTROL OF SECRETION
00167 01026* 01910* 01949
HORMONAL CONTROL OF SMALL INTESTINE
00236 00237 01160* 02048* 02759 03660 03797* 03800*
04672* 04685 05443* 05875 06372* 06389 06510*
HORMONAL CONTROL OF STOMACH
01018* 01029* 01917* 01925 01928 02270 06302* 06383
09073*
HORMONAL CONTROL OF STOMACH ACID SECRETION
00131* 00132* 00133* 00136* 00137* 00143* 00145* 00146*
00148* 00157 00158 00159 00163 00165 00166 01913*
01914* 01916* 05496*
HORMONAL CONTROL OF STOMACH SECRETION
00156 00164 00486 01011* 01027* 01030* 01040 01041
01042 01906* 01909* 01911* 01912* 01915* 01919* 01930
01950* 02048* 02249* 02252* 02254* 02256* 03703* 03956
03956 04853* 04856* 04907 05857 06405* 06410* 06413*
07281* 07289* 07292* 08165* 08171* 08185* 08192 09061*
09980* 09991* 10100* 10107
HORMONAL TREATMENT OF GASTROINTESTINAL TRACT
10278*
HORMONE METABOLISM
00214 00215 03454* 03785 05262* 08183* 08230* 08239*
08276 09166 10037* 10078* 10290 10840
HORMONE METABOLISM,LIVER
05575 05594
HYPERCALCEMIA
00134* 02900 07292*
HYPERCHLORHYDRIA
08176*
HYPERGLYCEMIA
03050* 05352 08216* 10119*
HYPERLIPEMIA
05541* 07816 07856 08751
HYPERPLASIA
00412 00506* 00512 00513 00514 00780 00825* 01523
01720 03049*

HYPERTENSION DIAGNOSIS,PORTAL
00272* 00326 00738* 06978 07479* 07839* 09201* 09240*
09615*
HYPERTENSION ETIOLOGY,PORTAL
04258* 06133 08762*
HYPERTENSION IN CHILDREN,PORTAL
04286 06105 06109 06117 06126 07010 10169 10554*
10632 10640
HYPERTENSION PATHOLOGY,PORTAL
06075* 06198 10657
HYPERTENSION SURGERY,PORTAL
01488* 06109 06126 06190* 06196 06201 06203 06204
06205 07010 07808* 07828* 07875 07953* 08754* 08759*
08796 08807 09123* 09615* 09644* 09781* 09789 10553*
10562* 10570* 10580* 10616 10624 10668 10726* 10755
10772*
HYPERTENSION TREATMENT,PORTAL
02558* 03469 04257* 04258* 05270* 05273* 05274 05281
05285 05286 06062* 06198
HYPERTHERMIA
03585 04519
HYPERTROPHY
00207* 00413 00417 07679 10221 10239
HYPOCHLORHYDRIA
05501* 05929* 06626
HYPOGLYCEMIA
00145* 01659* 01660* 02235 03050* 03309 04565* 05176
05188 06615* 07312* 09070* 10273* 10275*
HYPOTHALAMUS
06517* 07973*
HYPOTHERMIA
SEE ALSO COOLING TREATMENT OF BLEEDING
00029 01650* 02456 04667 05158* 05540* 07468 07812
09631* 10095 10237
HYPOXIA
00126 01835* 05158* 08246* 09026* 10006*

ICTERUS
SEE JAUNDICE
ILEITIS
01675* 06785 07689 07700* 08608 10337* 10348
ILEITIS,REGIONAL
01794 06802 06807 07570 07704 08605* 09925*
ILEOCECAL VALVE
05638* 05909 07667
ILEOSTOMY
00537 02347* 04917* 06741* 07194 07658* 07788* 08126*
08648* 09585* 10345* 10496 10504*
ILEUM
SEE ALSO SMALL INTESTINE
08521* 09185* 10120* 10337*
ILEUS
SEE ALSO LARGE INTESTINE OBSTRUCTION
SEE ALSO SMALL INTESTINE OBSTRUCTION
00067* 00518 00526 00531 00561 00987* 01371* 02168
02309 02311 02625 02972 03180 04027 04033 04034
04038 04055 04060 04447 04459* 04938 05329 05681
05865* 05900 05901 05902 06224 06239 06762 06766
06775 06780 06945 07688 08571 08584 09435 09436
09458 09462 09464 09575 09956* 10332* 10334* 10360
10361 10376 10380 10381 10384 10426*
ILEUS,BILIARY
00798 00801 01636 09803* 09824 10793
ILEUS,MECONIUM
04015* 04017* 04033 04458* 05333* 06043 06944 08672
10520
IMMUNE REACTIONS
SEE ALSO MICROORGANISMS
06799* 06800* 07838* 10057*
IMMUNOGLOBINS
06258*
IMMUNOGLOBULINS
00552* 00928 01574* 01604* 01679* 01779 02058* 02618*
02633 02690 03576 04607* 04970* 04976* 05001 05146*
05337* 05417* 05611 05930* 06161* 06399* 06609* 06968*
06974* 07193 07478* 07714* 07923 08012* 08039 08598
08635 08790 08870 09496 09497 09498 09747 10068*
10593 10693* 10695*
IMMUNOLOGY
SEE ALSO MICROORGANISMS
01177* 01184 01204* 01319 01320 01721 05528* 06659
06830 06956* 07008 07585* 07647* 07707* 07800 08247*
08279 08411 08938* 09364 09501 10387* 10392* 10417
10520 10586* 10724 10739* 10812*
IMMUNOLOGY IN ULCERATIVE COLITIS
06916*
IMMUNOSUPPRESSION
00544 00698* 00733 00752 06309* 06929* 07088* 07547
07647* 07697* 08217* 08604* 08827* 08938* 09473 09654*
10041* 10069* 10334* 10362 10511* 10569* 10691* 10694*
10715* 10724 10817* 10825 10843
INFARCTION
SEE ALSO CARDIOVASCULAR SYSTEM
03555 07964 09622 10143 10810*
INFECTIONS,ABDOMEN
SEE PERITONITIS
INFILTRATION,CELLULAR
10336*
INFLAMMATION
07863 08561 10336*
INGUINAL HERNIA
06782 07663 08937*
INSTRUMENTS
04705* 05289* 05290* 05312 05500* 05503* 05622* 05626*
05627* 05638* 05644* 05684 05719 05951* 10145 10578*
INSULIN
00145* 00146* 00444* 00448* 00449* 00450* 00668 01334*
01651* 01909* 01935* 01959* 02097* 02120 02560* 02798*
02805 02814 02830 02850* 02902 02908* 03120* 03121*
03624* 03688 03739 04565* 04628* 04631* 04649* 04773*
05095* 05554* 06407* 06689* 06701* 07033 07089* 07104*
07239* 07293* 07312* 07616* 08165* 08213* 09133* 09633*
09924* 10098 10273* 10274* 10326 10731*
INTOLERANCE,MILK
00552* 00558 01396* 01410 01661* 02326* 02327* 02337
03193 04984 04985 04997 05004 05921* 05923* 05928*
05940 09492 09495 10400* 10409* 10412* 10425 10853
INTOLERANCE,SUGAR
02329* 03188* 03190* 03201 04675* 06812* 06815* 06818*
07150* 07483* 07531 07713* 08614* 08615* 08618* 08622*
08631 08752* 08760* 09487 09491 09494 09499 09881
10412* 10420
INTRINSIC FACTOR
00950* 05453* 06316 07236* 07586* 08125* 08162* 09845*
09930* 10405*
INTRINSIC FACTOR ANTIBODY
00014* 03700* 08390* 10200* 10220
INTRINSIC FACTOR,STOMACH
00483 01925 02095* 02254* 02255* 02791* 03604* 04600*
04601* 05501* 06524*
INTUSSUSCEPTION
00455* 00580 00587 01221 01222 01375 02123 02124
02654 03053* 04035 04063 04142 04923 05061 05680
05891 05906 06744* 06754 06904 07734 08461 08524*
08538 08546 08659* 09431* 09434 09461 09462 09469
10241 10332* 10455
ION TRANSPORT
00033* 00034* 00035* 00046* 00051* 00052* 00053* 00055*
00059* 00061* 00063* 00064* 00077 00086 00953* 00961
00966 01013* 01014* 01047 01048 01078* 01847* 01854
01857 02732* 02733* 02744* 02750 02795* 02796* 03285*
03627* 03628* 03629* 03632* 03636* 03637* 03638* 03641*
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04211* 04212* 04484 04514 04531* 04532* 04533* 04537*
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05633* 05935 06346* 06347* 06353* 06817* 07241* 07258
07290* 07360 07418 07455 08114* 08126* 08180* 08186*
08225* 08387* 08480* 08940* 09029* 09035 09062* 09084
09138* 09200* 09932* 09934* 09971* 10015* 10126*
IRON ABSORPTION
00036* 00085 00830* 00960 01219 01832* 01833* 01834*
01835* 02290* 03622* 03630* 03633* 03634* 04403 04536*
05435* 05438* 05591 05771* 05937 06351* 06358 06359
06739* 07248* 08293* 08413 09693 09935* 09938*
IRON DEFICIENCY
01552 01833* 07248* 09938*
IRON DEFICIENCY ANEMIA
05771* 06669 08988* 09493 10198* 10842
IRON METABOLISM
00036* 00037* 02684 02901 04012 04988 05215* 05855
06073* 06162* 06359 06739* 07869 09036
IRON METABOLISM,LIVER
00651* 00657* 00740* 01201* 01552 04391* 05215* 05591
06072* 06073* 06194* 06329 06444* 06490 06539* 07100
07435 07481* 07836* 08812 10070* 10083 10575* 10677
10728*
IRON STORAGE DISEASES
05215*
IRON,SERUM
02475 06663 07073
IRRITABLE COLON
00571* 00624 00864 02668 03244 05006* 07777 08557
09536 10431* 10462 10474 10498
ISCHEMIA
00092* 00683 00685 01432 01678* 02317 02354* 02444*
02445* 02622 02647 02707* 03756* 04046 04108* 04123*
04308 04465 04649* 04940 05023* 05309 05907 05992
06747 06789 06835* 06970* 07654* 07773 07850 08522*
08551 08571 08657* 09116* 09186* 09428* 09429* 09467
09523* 09562 09586* 09923* 10006* 10344* 10386 10463
10492

JAUNDICE
00659* 00682 00791 00794 00805 01068* 01533 01534
01536 01554 01562 01563 02434* 02438* 02447* 02449*
02478 02489 02495* 02537 02591 03370 03372 03433
03598 04261* 04291 04314 04318 05122* 05197 05254*
05836 06118 06125 07024 07120 07506 07510 07871

JAUNDICE
 CONTINUED
 07961 08840 08902 09689 09797* 09894* 10695* 10696*
 10773*
JAUNDICE DIAGNOSIS
 00325 00653* 03462* 03830* 04694* 04703* 04706 04712
 05175 06526* 06535* 06976 06977 07488* 07822* 07963
 07987 08773 08859 09593 10134*
JAUNDICE DIAGNOSIS,RADIOLOGY IN
 06551 10669
JAUNDICE EPIDEMIOLOGY
 07846*
JAUNDICE ETIOLOGY
 00695* 01640 01642 04290 05175 05209* 06108 06138
 06151 09612 09712*
JAUNDICE IN CHILDREN
 05315 06137 07021 10559*
JAUNDICE OBSTRUCTIVE
 02441*
JAUNDICE PATHOLOGY
 05307
JAUNDICE SYNDROMES
 09773
JAUNDICE TREATMENT
 05291* 06061* 06137 06964* 07021 10559*
JAUNDICE,BIOCHEMICAL DIAGNOSIS OF
 10144
JAUNDICE,CIRCULATION IN
 06964*
JAUNDICE,DISEASES ASSOCIATED WITH
 01625*
JAUNDICE,NEONATAL
 00693 01069* 02845* 06968* 06975* 07001 07488* 07844*
 07846* 07853 08760* 08780 08781 09204* 09686 09712*
 09802* 10623
JAUNDICE,OBSTRUCTIVE
 00325 00335 00524 00707* 00768* 01262 01535 01614
 01624* 01625* 01639 01641 01798 02303 02583 02599
 02851* 03351* 03489* 04263* 04317 04419* 04448 04456*
 04604* 05101 05271* 05315 05651* 06061* 06069* 06123
 06233 06964* 06977 07050* 07827* 07979* 07984* 08303
 08905 09793* 09821 10614 10777
JAUNDICE,SERUM BILE PIGMENTS IN
 00274* 02845* 02851* 04419* 05546* 06964* 08758*
JEJUNUM
 SEE ALSO REGIONAL ENTERITIS
 SEE ALSO SMALL INTESTINE
 06349* 06509* 06654 06665 06750 06770 07232 09185*
 09446 09465 10366

KERNICTERUS
 01553 10617
KIDNEY
 00216 00563 00670 00749 01474 01494* 01515 01625*
 01626* 01791 02101* 02149 02164 02342 03709* 03740*
 04314 04322 04384 04407* 04557 04598* 05155* 05160
 05167 05221* 05265* 05292* 05393 05506* 05553* 05563
 05665 05740 05927* 06032* 06123 06193* 06260* 06358
 06778 06951* 07835* 07883 07884 07926 07955* 07996
 08014* 08183* 08519* 08628 08785 08906 09627 09659
 09696 10031* 10209 10515 10554* 10641 10644 10655
 10694* 10722 10733* 10740 10748 10749 10817* 10825
 10843
KININS
 SEE ALSO BRADYKININ
 06340 06617* 09958*
KWASHIORKOR
 01657* 01767 02331* 02669 04998 05938 05946* 06815*
 08042 08953 10853

LACTASE
 08614* 10399*
LACTASE DEFICIENCY
 00556 00557 01411 01667* 02100* 02327* 04971* 04973*
 06253 06536* 07685 08526* 08615* 08618* 08622* 08642
 08674 09199* 09480* 09483* 10398* 10400* 10407* 10409*
 10503* 10853
LACTOSE
 01410 02069 02337 03190* 03193 03194 04092 04095
 04099 04675* 08614* 09495
LACTOSE ABSORPTION
 00231* 04078* 04092 04675* 04984 04985 04997 04998
 05004 05921* 05923* 05928* 05940 06261* 06815* 09480*
 10398* 10407* 10503*
LARGE INTESTINE
 SEE ALSO CECUM
 SEE ALSO COLITIS
 SEE ALSO DIARRHEA
 SEE ALSO DYSENTERY
 SEE ALSO ENTEROCOLITIS
 SEE ALSO ILEOCECAL VALVE
 SEE ALSO ILEUS
 SEE ALSO INTUSSUSCEPTION
 SEE ALSO SIGMOID
LARGE INTESTINE
 CONTINUED
 02382
LARGE INTESTINE ABSCESSES
 07751
LARGE INTESTINE ABSORPTION
 00062* 00069 00086 00953* 00954* 02396* 02742* 02751
 03632* 03641* 04543* 04551 04558 05461 06185* 06186*
 06347* 06353* 06365 07262 08115* 08124* 08133 09021*
 09023* 09029* 09035 09921* 09924*
LARGE INTESTINE ANGIOGRAPHY
 00617 05687 06875 08664 10445
LARGE INTESTINE ANOMALIES
 01420* 02368 03235 03275 03467 04064 04198 05042
 05044 05051 05065 05642* 05889 05973 05977 05979
 06005 06016 06898 07731 08710 09524* 09538 09565
 10497
LARGE INTESTINE ATRESIA
 02938 05642* 09450
LARGE INTESTINE BIOCHEMISTRY
 01428 01429 02713* 02895*
LARGE INTESTINE BIOPSY
 02352* 02359* 02399* 07500 08706 09235 09556
LARGE INTESTINE BLEEDING
 05962 05965 05970
LARGE INTESTINE CANCER
 02680 02687* 02945 03209* 03211* 03214* 03215* 03216*
 03221* 03234 03236 03253 03259 03267 03271 03272
 03273 03274 03283 03285* 03545* 03548* 03847 03928
 03960 04110* 04116* 04117* 04118* 04118* 04119* 04120*
 04121* 04127 04149 04151 04154 04155 04158 04159
 04163 04165 04166 04168 04169 04172 04176 04179
 04183 04184 04185 04186 04187 04190 04196 04199
 04205* 04213 04216 05007* 05008* 05008* 05012* 05013*
 05014* 05015* 05017* 05024 05034 05036 05037 05038
 05046 05047 05059 05060 05064 05071 05077 05088
 05643* 05947* 05948* 05954* 05955* 05973 05984 05985
 05986 05994 05996 05997 06009 06023* 06834* 06867
 06909 07726* 07745 07757 07770 08586 08652* 08665
 08691 08692 09322 09532 09572 09579 09581 10458
 10479 10486
LARGE INTESTINE CARCINOGENESIS
 03209* 03215* 04159 04162
LARGE INTESTINE CHEMICAL COMPOSITION
 02895*
LARGE INTESTINE CIRCULATION
 00116 00240* 01183 03822 04177 06353* 06517* 07654*
 07659 07765 09037* 09041 09190*
LARGE INTESTINE CYSTS
 00586 03260 07780 08653* 09566
LARGE INTESTINE DEVELOPMENT
 09007
LARGE INTESTINE DIAGNOSIS
 00265* 00316 00317 00357 00624 01227 01229 01452
 01453 02099* 02128 02129 02130 02131 02132 02354*
 02359* 02397* 02923 02934 02938 02945 02946 02966
 03205* 03226* 03244 03286* 03298 03834* 03846 03847
 03848 04165 04175 04200 04215 05009* 05027 05036
 05049 05063 05071 05084 05088 05642* 05644* 05684
 05685 05686 05961 05969 05979 05981 05982 05991
 06002 06530* 06801* 06873 06906 07156* 07482* 08653*
 08712 08713 08720 09511* 10387* 10450 10468
LARGE INTESTINE DISEASE EPIDEMIOLOGY
 08603* 08605* 08656* 09554 09581
LARGE INTESTINE DISEASE ETIOLOGY
 00571* 00588 01415* 01422* 02358* 09526* 10388* 10431*
LARGE INTESTINE DISEASES
 00600 00602 00603 02698 03181 03258 04136 04138
 04168 04177 04967* 05029 05040 05048 05055 05076
 05078 05946* 05952* 05956* 05966 05969 05972 05974
 05975 05980 05981 05992 05999 06001 06002 06008
 06757 06855 06869 07151* 07663 07685 07748 07779
 07782 07783 07786 08551 08555 08558 08574 08663
 08717 09573 09581 10455 10470 10490 10804* 10860*
 10865
LARGE INTESTINE DIVERTICULA
 00570* 00571* 00590 00592 01448 02355* 03208* 03210*
 03252 03263 03265 03680* 04115* 04144 04146 04147
 04167 05021* 05067 05072 05961 05963 05967 06841*
 06864 06866 06876 06906 07736 07737 07781 08644*
 08646* 08693 09511* 09517* 09520* 09564 09577 10431*
 10469 10475 10498
LARGE INTESTINE DIVERTICULITIS
 00591 01445 01446 03212* 03224* 03251 03284 04125*
 04170 04456* 04459* 05019* 05022* 08650* 08670 08694
 10438* 10460
LARGE INTESTINE ENDOSCOPY
 00315 00316 00317 06530* 07738 07749 07760 07763
 09198* 09513* 09556
LARGE INTESTINE ENZYMES
 02399* 06311* 06512* 08108 09906
LARGE INTESTINE FISTULAS
 03230 03543 03946 03946 04172 04181 05115 05971
 06006 06885 06886 06887 08654* 08665 08700 09395
 09511* 10436*

LARGE INTESTINE HISTOLOGY
00568* 00905* 01805* 01806* 01807* 02398* 03214* 03294
03300 07212 07218 09959*
LARGE INTESTINE IMMUNOLOGY
01456* 01457* 01458* 02350* 02357* 03222* 03807 04216
10106*
LARGE INTESTINE IN CHILDREN
00574* 02357* 02359* 03223* 03226* 03227* 03228* 03266
04143 05024 05042 05081 05946* 05953* 05978 06000
06544 07191 07778 08672 08714 09510* 10115* 10464
LARGE INTESTINE INJURIES
05083 05960 05964 07724* 08715 10143
LARGE INTESTINE METABOLISM
02751 03795* 04162 05613
LARGE INTESTINE MICROORGANISMS
00594 00595 01415* 02052* 02352* 02365 02607* 02614*
03222* 03300 04106* 04134 04148 05020* 05084 05613
05614 05943* 05971 06007 06514* 07466 08285* 08578
08986* 09182* 10115* 10125* 10553*
LARGE INTESTINE MORPHOLOGY
00420 00594 00595 00928 01818 02713* 02714* 02729
04511 04523 05013* 05415* 05416* 05428 09903
LARGE INTESTINE MOTILITY
00097* 00098* 00115 00116 00569* 00570* 00992* 01001
01002 01003 01004 01005 01006 01860* 01868* 01869*
01873* 01888 02354* 02357* 02761* 03672* 03678* 03679*
03680* 03689 04107* 04113* 04580* 04585 04588 05052
05475 05476 05477 05478 05481 05483 05688 05957*
05967 05988 06376* 06393 06394 07264* 07266* 07267*
07269* 07757 09037* 09041 09044 09045 09924* 09942*
09943* 09945* 09955* 09956*
LARGE INTESTINE MUCOSA
00420 00888 00892 01428 01429 02350* 02351* 02362
02895* 03214* 03272 05013* 06511*
LARGE INTESTINE NECROSIS
02387 02388 04056 04201 05041 07764 08038
LARGE INTESTINE NEOPLASMS
00009* 01381 01430 02129 02362 02372 04145 04178
04191 04202 04511 06908 07729* 07776 08712 08718
09519* 09520* 09548 09577 10870
LARGE INTESTINE NEOPLASMS,BENIGN
00576* 05032 05058 06000 07723* 08708 09528* 10457
10476
LARGE INTESTINE NEOPLASMS,MALIGNANT
00265* 00567* 00578 00581 00582 00583 00607 01415*
01416* 01423 01424 01425 01426 01427 01429 01431
01432 01433 01434 01435 01436 01439 01440 01678*
02344* 02345* 02346* 02348* 02349* 02350* 02351* 02352*
02360 02361 02369 02370 02371 02373 02374 02375
02376 02378 02379 02389 02398* 06836* 06844 06846
06848 06863 06871 07736 07743 07753 07756 07769
07781 07787* 07834* 08650* 08651* 08658* 08661* 08675
08698 08700 08705 09508* 09516* 09518* 09523* 09528*
09561 09586* 10427* 10438* 10447 10448 10473
LARGE INTESTINE NEOPLASMS,VILLOUS
06838* 07774 08708 09547
LARGE INTESTINE OBSTRUCTION
00503* 01228 01432 01440 01447 02287* 03180 03205*
03207* 03226* 04133 04200 04913* 05027 05037 05059
05061 05069 05081 05894 05983 06542 06544 06872
06882 06905 07191 07665 07764 07795* 08650* 08683
08692 09427* 09436 09519* 09537 09575 09943* 09956*
10340* 10341* 10472
LARGE INTESTINE PATHOLOGY
00357 00596 02356* 02382 03214* 03215* 05010* 06832*
07500 08674 09581 10434* 10474 10500*
LARGE INTESTINE PERFORATION
00591 00598 00891* 02403* 03207* 04114* 04147 04176
04187 05011* 05026 05075 05959* 06835* 06849 06861
06861 07736 07747 07755 08645* 08688 08692 08703
08711 08981 08987* 09302* 09530 09544 10426* 10436*
10488 10506
LARGE INTESTINE POLYPS
00574* 00575* 00576* 00607 02356* 03206* 03214* 03215*
03216* 03223* 03257 03266 03267 04119* 04173 04217
05008* 05008* 05009* 05014* 05015* 05017* 05030 05031
05033 05054 05066 05953* 05987 06000 06897 06908
07749 07760 08691 09292* 09513* 09535 09556 10429*
10457 10459
LARGE INTESTINE RADIOLOGY
00318 00319 00567* 01226 01227 01228 01230 01231
01452 02128 02129 02130 02131 02132 02133 02923
02934 02945 03226* 03255 03261 03303 03863 04102*
04167 05034 05036 05063 05685 05999 06376* 06564
06833* 06835* 06837* 06838* 06857 06864 06876 06877
06878 06879 06880 06908 06909 06912 06913 07494
07748 07780 08644* 08659* 08710 08711 08722* 09520*
09521* 09523* 09576 10146 10340* 10341* 10449 10464
10492 10500* 10502*
LARGE INTESTINE REGENERATION
05013* 05612
LARGE INTESTINE SECRETION
02351* 06515 07459 10106*
LARGE INTESTINE STRICTURE
02395 04128 04170 05069 05868 06899 08654* 08707
09520* 10468
LARGE INTESTINE SURGERY
00572* 00574* 00583 00597 01416* 01417* 01418* 01419*
01440 01441 01447 01647* 02345* 02346* 02347* 02348*
02349* 02353* 02355* 02359* 02371 02377 02379 02380
02381 02383 02400* 02401* 02402* 02403* 02966 03206*
03207* 03208* 03210* 03211* 03212* 03213* 03220* 03224*
03225* 03232 03234 03241 03242 03251 03252 03253
03254 03256 03274 03279 03288* 03292 03297 04016*
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04158 04160 04174 04183 04184 04185 04186 04190
04206* 04209* 04913* 05012* 05012* 05016* 05018* 05021*
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06477 06737* 06742* 06774 06798* 06806 06841* 06859
06862 06865 06866 06867 06880 06887 07675 07698*
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07776 07778 08054 08573 08602* 08650* 08653* 08654*
08656* 08661* 08669 08685 08686 08693 08694 08698
08701 08723* 09508* 09509* 09510* 09511* 09512* 09515*
09517* 09519* 09522* 09525* 09528* 09543 09551 09563
09574 09585* 10116* 10428* 10430* 10432* 10436* 10438*
10444 10450 10460 10462 10466 10467 10482 10484
LARGE INTESTINE TRAUMA
03232 05960 05964 05965 06865 10488
LARGE INTESTINE TREATMENT
03250 04132 04151 05006* 05009* 05055 05083 05952*
05956* 05983 05991 05997 06799* 06800* 06905 07790*
09427* 09449 09526* 09566 10431* 10454 10459 10467
LARGE INTESTINE TUMORS,BENIGN
05993
LARGE INTESTINE ULCERS
00606 04141 05010*
LARGE INTESTINE ULTRASTRUCTURE
03271 03608* 03620 05020* 05416* 05481 05956* 06311*
07210* 07212 08662 09897
LARGE INTESTINE VOLVULUS
00601 02394 03213* 04126 04194 05023* 06012 06837*
07661 08682 08684 08719 09539 09553 09555 09562
LARGE INTESTINE,DISEASES ASSOCIATED WITH
00599 01430 01448 01675* 01685* 02384 02393 10393*
LARGE INTESTINE,DRUG EFFECTS ON
00531 02385 03262 03608* 03678* 04123* 04147 05478
05949* 05970 10446 10491
LARGE INTESTINE,DRUG TREATMENT OF
02348* 02356* 03286* 04124* 04209* 05006* 05020* 05053
05956* 05976 05989 05990 05995 06003 06014 06021*
06030 08666 09582* 09583* 09956* 10470
LARGE INTESTINE,FOREIGN BODIES IN
02367 07755
LARGE INTESTINE,HORMONAL CONTROL OF
00069 04107*
LARGE INTESTINE,NERVOUS CONTROL OF
02357* 02358* 02386 03795* 04109* 05685 08095 09044
LARGE INTESTINE,TOXIC EFFECTS ON
00568* 02405* 02407 05949* 05970 05990 10430* 10445
LAXATIVES
00879 01749 02505 03262 05212* 05353 05990 05995
06003 07041* 07183 08061 10446 10491 10844
LEAD
05430 07883 08130*
LEIOMYOMA
00391* 00402 00520 00521 01285 01286 01312 02226
02227 02304 03575 06574 06643 08359 08414 08459
09248 09315 10176 10216
LEIOMYOSARCOMA
07681 08570 08768* 08914 09300* 09457 10216
LEPROSY
03396
LEPTOSPIROSIS
02489
LEUCINE AMINOPEPTIDASE
07148*
LEUKEMIA
03887 06622 07178 08636 08790 08873 08948 10334*
10691*
LIPASE
01936* 06424* 06425* 07304* 07309* 08935* 09087* 09197*
10079
LIPASE SECRETION,PANCREAS
00179* 00188 02815* 03734* 03736* 03737* 04616* 05527*
05537 08203* 09089* 09618* 09999*
LIPASE SECRETION,STOMACH
01036* 01347*
LIPID ABSORPTION
00946* 00956* 01840* 01853 02747* 03601* 03654 03655
03661 03662 04080* 04101 04535* 04554 05413* 06341*
07242* 07309* 07718 08119* 08521* 08621* 09024* 09025*
09362 09370 10133*
LIPID DIGESTION
04093 05617 07304* 07309* 07706* 07788*

LIPID METABOLISM
01036* 01191 01853 02063 02064 02428* 02838* 03812
03830* 05580 05585 06064* 06423* 06424* 06425* 07204*
07209* 07372 07380 07421 07424 07453* 07465 07718
08105 08251* 08273 09006 09031 09105* 09114* 09410
LIPID METABOLISM,LIVER
00210 00212 00213 01130 01131 01132 01133 01140
01152 01153 01192 01525 01957* 01996 01998 01999
02036 02425* 02435* 02469 02482 02849* 02851* 02852*
02856* 02868 02876 02877 03340* 03352* 03489* 03758*
03775 03787 03790 04263* 04660 04664 05541* 06195*
06327 06433* 06434* 06445* 06458* 06459* 06473 06476
06500 06501 06502 06505 07032 07042* 07137 07327*
07328* 07337* 07346* 07378 07394 07406 07417 07420
07422 07423 07424 07427 07429 07432 07841* 07971*
08127* 08226* 08227* 08234* 08239* 08277 09158 09162
10028* 10044* 10055* 10092 10767*
LIPID METABOLISM,SMALL INTESTINE
00015* 02735* 03791* 03793* 03798* 03799* 03805 03812
04082* 04094 04960
LIPIDOSIS
06839* 07009 07711* 07874 08046 09651*
LIPIDS
01413 10560*
LIPIDS,PLASMA
00314 09114* 09710* 10051*
LIPOMA
00398 06623 06625 06850 10176 10429* 10476
LIPOPROTEINS
00210 01204* 01994 01995 06345* 06459* 07328* 07413
08082* 08926 09710*
LIVER
SEE ALSO AMEBIASIS
SEE ALSO BILE
SEE ALSO BILIARY TRACT
SEE ALSO BLOOD COAGULATION
SEE ALSO CHOLESTASIS
SEE ALSO CIRRHOSIS
SEE ALSO FOLIC ACID
SEE ALSO GLYCOGEN STORAGE DISEASE
SEE ALSO HEMOSIDEROSIS
SEE ALSO HEPATITIS
SEE ALSO PARASITES AND PARASITIC DISEASES
SEE ALSO PORPHYRIA
SEE ALSO SCHISTOSOMIASIS
SEE ALSO SULFOBROMOPHTHALEIN
SEE ALSO VITAMINS
01828 02567 03402 06326 07012 07703 09592 09683
09878 10128 10289
LIVER ABSCESSES
02689 02692 02694 02696 03375 03827* 04264* 04285
05203 05206 06119 06130 06131 06132 06142 06245
06286 06967* 08784 08809 09884 09885 10645 10654
10656
LIVER ABSORPTION
02746* 03630* 03639* 03644* 03647* 03659 04554 05451*
05455 05459 05460 05568 08234* 08274 09723
LIVER AMINO ACID METABOLISM
01081* 01097 01098 02021 02022 03759* 05544* 06332
06498 07330* 07344* 07369 07837* 08257 09157 09160
10019* 10046* 10047* 10080
LIVER AMMONIA EXCRETION
00220 00669 02444* 05147* 05282 07329* 07847* 08225*
09661 10553* 10701
LIVER ANGIOGRAPHY
00356 02105* 02146 02147 02150 02915* 02932 02951
02952 03375 03376 03381 03477 05144* 05696 06083
06085 06086 06529* 06978 06979 06983 07127 07521
07825* 07899* 07900* 08830* 08985* 09193 09196 09638*
09647* 09656* 09657* 09670 09907 10135* 10577* 10607
10650 10726*
LIVER ANOMALIES
00323 01500 03958 04420* 05726 06082 06093 06227
07007
LIVER BIOCHEMISTRY
00977 01079* 01083* 01115 01118 01561 01564 01601*
01620 01808* 01822 01824 01988 01989 02016 02019
02024 02028 02437* 02710* 02722 02870 02880 02882
03346* 03352* 04524 04529 05403* 05421 05570 06076*
06539* 07223 07235 07356 07359 07366 07395 07397
07398 07401 07404 07405 07408 07409 07410 07433
07436 07437 07438 07439 08102 08223* 08256 08272
10023* 10068* 10084 10628
LIVER BIOPSY
00273* 00275* 00321 00760* 00764* 00835 01200* 01201*
01233 01234 01235 01249 01529 01530 01605* 01973*
02107* 02138 02139 02479 02569 02930 02971 02984
03434 03857 04717 05142* 05191 05252 05711 06223*
06538* 06984 06990 07020 07489* 07860 07912* 08317
08770 08821 09221 09655* 09663 09692 09708 09785
10136* 10140 10565* 10566* 10568* 10575* 10579* 10596
LIVER CALCULI
10770* 10771* 10773*
LIVER CANCER
02433* 02452 02455 02456 02458 02459 02460 02461
02462 02463 02464 02466 02467 02486 02883 02919*
03339* 03343* 03344* 03359 03366 03370 03374 03377
03379 03382 03387 03388 03391 03394 03473 03482
03840 04270* 04271* 04273* 04274* 04277* 04297 04301
04319 04321 04702* 04720 05148* 05157* 05163 05172
05174 05190 05193 05196 05202 05205 05257 05593
05648* 05654* 05656* 05696 05703 05704 05706 06063*
06066* 06071* 06073* 06080 06081 06084 06085 06086
06087 06097 06102 06112 06115 06118 06127 06128
06138 06199 06540* 06560 06763 06996 07005 07023
07157 07834* 07849 08651* 08875 09655* 09667 09695
09703 10226 10427* 10564* 10565* 10574* 10623 10626
10643 10661 10813*
LIVER CARBOHYDRATE METABOLISM
01134 02002 02003 02476 02849* 02857* 02943 04506*
04660 06439* 06466* 06481 06488 06503 07341* 07387
07826* 08252 08254 08265 08280 08282 08760* 09125*
09155 09233 10301
LIVER CARCINOGENESIS
02457 02461 02492* 02883 03379 03408* 03745* 04274*
04295 04300 04336 07897* 07898* 07906 10048*
LIVER CHEMICAL COMPOSITION
01828 01829 06435* 06441* 06961* 07225 07362 07389
07826* 08224* 08267 09146 09151
LIVER CHOLESTEROL METABOLISM
00708* 01072* 02033 02425* 02836* 02849* 04278* 04638*
04639* 05157* 05288* 05548* 05550* 06064* 06437* 06470
06475 07311* 07342* 07351* 07430 08240* 08885* 09120*
09143 09148 09912* 10020* 10045* 10060* 10093
LIVER CIRCULATION
00205* 00206* 00214 00220 00238* 00239* 00243 00249
00250 00324 00669 00681 00682 00683 00684 00686
00751 00772* 00910* 00930 01171* 01174* 01180 01181
01242 01243 01485* 01492* 01961* 01970* 02082* 02090
02091 02105* 02429* 02436* 02437* 02562* 02853* 02915*
02951 02952 02953 02955 02982 02985 02986 03357
03367 03368 03369 03376 03380 03383 03395 03468
03474 03477 03596* 03756* 03762* 03817* 03819 03823
03824 03926 04268* 04278* 04303 04306 04308 04310
04320 04388* 04393* 04396 04398 04420* 04554 04642*
04649* 04687 04688 05144* 05145* 05148* 05149* 05156*
05161 05163 05199 05264* 05267* 05270* 05273* 05274
05324 05327 05576 05622* 05629 05649* 05697 05698
06026 06062* 06065* 06066* 06075* 06077 06096 06101
06187* 06319 06336 06340 06516* 06518* 06520 06959*
06982 06991 07043* 07143 07329* 07820* 07850 07852
07890 07960 08235* 08759* 08829* 09001* 09011 09119*
09144 09187* 09193 09194 09196 09647* 09653* 09701
09702 09907 10018* 10026* 10678
LIVER COMA
01506 01556* 02434* 03342* 03362 03363 03385 03486
04272* 04276* 05147* 05151* 05169 05170 05171 05192
05227* 05237 06060* 06077 06088 06121 06129 06160*
06183 06186* 06969* 06999 07840* 08250* 08799 09640*
09646* 09665 09746 10426* 10582* 10588* 10589* 10591*
10628 10652 10716*
LIVER COPPER METABOLISM
00934 01199* 04262* 05178 06113 06194* 07025 07039*
09012 09790
LIVER CYSTS
00358 00690 00691 01269 01270 01501 01799 02700
02932 03375 03378 04279 04284 04294 04296 04316
05155* 05186 06111 06120 06128 06958* 06962* 07897*
08074 08985* 09681 09694 09707 10607 10620 10638
10771*
LIVER CYTOLOGY
02454 02465 02731 03357 04266* 04529 04545* 04662
05431 05568 05703 06078
LIVER DEVELOPMENT
02712* 02726 02863* 04512 04636* 04648* 04666 05418
05564 05566 05567 06137 06469 06486 06962* 08270
09156 09892* 10032*
LIVER DIAGNOSIS
00270* 00272* 00273* 00275* 00321 00322 00324 00327
00328 00356 00358 00359 00657* 01200* 01233 01234
01235 01236 01237 01238 01239 01240 01244 01245
01246 01489* 01536 01555* 01606* 01973* 02107* 02138
02139 02140 02141 02142 02143 02144 02146 02147
02148 02149 02150 02155 02919* 02930 02947 02959
02976 02984 03344* 03400 03401 03827* 03831* 03833*
03837 03840 03859 03862 04266* 04282 04386* 04698*
04720 04721 05173 05184 05200 05202 05557* 05648*
05649* 05652* 05654* 05655* 05656* 05658* 05696 05697
05698 05699 05701 05702 05703 05704 05705 05706
05709 05711 06063* 06070* 06083 06114 06532* 06539*
07000 07002 07096 07108* 07479* 07481* 07484* 07491*
07504 07506 07508 07518 07523 07529 07834* 07848
07888 07949 08292* 08318 08756* 08765* 09206* 09233
09647* 09673 09776* 10076* 10557* 10608 10665
LIVER DISEASE COMPLICATIONS
02442* 02470 02488 02554* 02563* 02564* 02914* 05154*
05167 05192 06111

LIVER DISEASE DIAGNOSIS
SEE ALSO LIVER FUNCTION TESTS
01199* 01201* 01516 01517 01528 01529 02106* 02439*
02459 02470 02479 02487 02504 02958 02971 03372
03456* 03826* 03844 04259* 04373 04692* 04693* 04694*
04702* 04703* 04704* 04708 04710 04717 05174 05189
05200 05553* 05647* 05648* 05652* 05658* 06067* 06070*
06141 06162* 06182 06200
LIVER DISEASE EPIDEMIOLOGY
01495* 01496* 03338* 04274*
LIVER DISEASE ETIOLOGY
01527 01537 02483 04272* 04329* 06200
LIVER DISEASE PATHOLOGY
06067* 06122 06134 06135
LIVER DISEASE TREATMENT
00663* 00664 00665 00752 00758 01764 02452 02455
02468 02473 02477 02480 02481 02482 02504 04265*
04271* 04309 05143* 05153* 05156* 06060* 06088 06092
06120 06121 06969* 06970* 06975* 06999 07004 09680
09705
LIVER DISEASES
00541* 00654* 00665 00666 00667 00668 00669 00678
00683 00684 00694 00722 00739* 00740* 00754 00895
00896 01498* 01790 02438* 02441* 02445* 02447* 02468
02472 02473 02474 02476 02483 02484 02485 02501
02508 02655 02695 02699 02982 03229* 03343* 03361
03364 03365 03390 03396 03399 03400 03401 03404
03605* 04163 04263* 04269* 04286 04298 04307 04309
04312 04320 04340 04384 04404 04455 04624* 04698*
05138* 05139* 05140* 05142* 05148* 05160 05161 05167
05173 05176 05177 05179 05189 05194 05204 05207
05379 05697 06065* 06067* 06078 06079 06090 06094
06098 06104 06107 06110 06114 06116 06125 06128
06134 06135 06139 06145* 06195* 06223* 06292 06956*
06966* 06974* 07015 07017 07028 07029 07031 07489*
07518 07830* 07833* 07835* 07850 07851 07854 07855
07859 07862 07864 07865 07884 07948* 08016* 08760*
08771 08772 08776 08789 08790 08792 08795 08798
08802 08804 08805 08808 08813 08820 08849 08936*
08979 09481* 09639* 09650* 09676 09677 09678 09699
09883 09925* 10073* 10118* 10149 10161* 10554* 10558*
10575* 10576* 10578* 10593 10596 10601 10610 10619
10625 10627 10634 10639 10644 10663 10673* 10694*
10696* 10698 10782 10863
LIVER DISEASES IN CHILDREN
03339* 03341* 03345* 03376 03382 04272* 05141* 05152*
05156* 05197 05199 05206 06121 06958* 06960* 06967*
06968*
LIVER DISEASES,BIOCHEMICAL DIAGNOSIS OF
10136*
LIVER DISEASES,BLOOD COAGULATICN IN
00270* 03478 04404 07951 08814 09745
LIVER DISEASES,DISEASES ASSOCIATED WITH
00668 00751 01657* 02451*
LIVER DISEASES,METABOLIC CHANGES IN
01966* 06966* 07013 07330* 07842* 08800 08812 09128*
09697 09894* 10641 10648 10659
LIVER DRUG METABOLISM
00218 00219 00223 00224 00232* 01074* 01075* 01089*
01144 01146 01147 01550 01559* 01950* 01963* 01974*
02032 02037 02862* 02872 02883 02887 03351* 03745*
03746* 03748* 03751* 03785 04322 04640* 04641* 04665
04668 05284 05543* 05550* 05551* 05565 05576 05582
05590 06442* 06446* 06447* 06448* 06456* 06457* 06493
06495 07324* 07353 07363 07887 08222* 08228* 08243*
08245* 08278 09107* 09108* 09115* 09118* 09134* 09153
09227 10034* 10037* 10055* 10065*
LIVER ELECTROLYTE METABOLISM
00064* 00071 02443* 08917
LIVER ENZYME SECRETION
09639*
LIVER ENZYMES
00020* 00193* 00195* 00201* 00203* 01082* 01083* 01096
01104 01106 01107 01108 01109 01110 01111 01112
01113 01114 01115 01116 01117 01118 01119 01120
01121 01122 01123 01151 01192 01522 01534 01536
01544 01545 01546 01547 01549 01550 01559* 01614
01808* 01951* 01952* 01953* 01954* 01971* 01972* 01978
01979 01980 01981 01982 01983 01984 01985 01986
01987 01988 01989 01990 01991 01992 01993 01997
02010 02015 02018 02020 02025 02028 02045 02438*
02466 02502 02513* 02522 02841* 02853* 02855* 02856*
02857* 02863* 02869 02870 02871 02875 03341* 03351*
03353* 03354* 03398 03399 03410 03411 03413 03417
03419 03421* 03426* 03427* 03450 03460* 03644* 03742*
03746* 03761* 03764 03774 03777 03778 03780 03786
03788 03789 03813 04247 04293 04298 04407* 04633*
04635* 04638* 04644* 04652* 04653 04706 04710 04712
05172 05204 05401* 05421 05424 05464 05538* 05540*
05551* 05552* 05561 05564 05566 05567 05577 05579
05583 05584 05590 05595 05597 06108 06115 06137
06145* 06146* 06184 06194* 06331 06332 06333 06432*
06439* 06440* 06444* 06451* 06457* 06458* 06461* 06467
06474 06486 06492 06513* 06538* 07029 07030 07229
07234 07235 07311* 07321* 07322* 07325* 07336* 07340*
07341* 07344* 07356 07358 07359 07361 07371 07377
LIVER ENZYMES
CONTINUED
07382 07386 07388 07392 07395 07396 07397 07398
07399 07400 07401 07403 07404 07405 07406 07407
07408 07409 07411 07419 07423 07425 07432 07433
07436 07437 07438 07439 07440 07441 07442 07444
07446 07452* 07492* 07836* 07887 07958* 08081* 08110
08233* 08236* 08238* 08243* 08244* 08249* 08261 08265
08269 08270 08271 08272 08274 08279 08280 08283
08756* 08800 08817 09103* 09113* 09126* 09145 09161
09167 09631* 09664 10038* 10039* 10043* 10059* 10063*
10066* 10076* 10096 10104* 10596
LIVER FIBROSIS
00656* 00660* 01488* 01551 01620 04260* 04313 06062*
07862 07866 10618 10714* 10745 10861
LIVER FISTULAS
08829* 08874
LIVER FUNCTION TESTS
00205* 00270* 00271* 00324 00325 00626* 00663* 00687
00705 00707* 00708* 00734 00739* 00740* 00745 00768*
01148 01200* 01236 01237 01239 01494* 01548 01618
01652* 01684* 01965* 01966* 01970* 01973* 02039 02140
02141 02152 02512* 02527 02534 02867 02881 02925
02943 02970 03364 03786 03851 04247 04289 04381
04661 04704* 05139* 05140* 05155* 05160 05165 05180
05264* 05296* 05320 05451* 05540* 05557* 05587 05598
05652* 05655* 05699 06136 06146* 06180 06191* 06477
06531* 06980 06985 07090* 07172 07370 07523 07824*
07827* 08250* 08292* 08328 08399 08769 08770 08775
08778 08791 08813 08816 09110* 09117* 09150 09220
09236 09407 09655* 09661 09692 09696 09698 09784
10072* 10097 10559* 10598 10631 10663
LIVER GLUCOSE METABOLISM
00213 01984 01994 01997 02012 02490* 02502 02568
02847* 02853* 02857* 02888* 04649* 06191* 06489 06491
06518* 07357 08216* 10024* 10063*
LIVER GLYCOGEN
00195* 01102 02725 02846* 02847* 02857* 04287 04524
05176 05538* 05554* 06140 08103 08260 08752* 09125*
09892* 10033*
LIVER GLYCOGEN METABOLISM
01498* 01576* 01952* 01988 01989 02019 02477 02880
03341* 05196 05552* 05562 06485 07387 07445 09139
LIVER HISTOLOGY
00029 00191* 00275* 00655* 00697* 00698* 00712* 01570
01605* 01830 02511* 02552 02710* 02711* 02722 02874
03388 03611 03780 04273* 04276* 04288 04324* 04349*
04378* 04717 05255* 05272* 05403* 06078 06314* 06328
06539* 07225 07844* 07957* 08103 08110 08224* 08261
08271 09018 09827 09892* 09898 09899 10032* 10082
10093 10568*
LIVER HORMONE METABOLISM
05575 05594
LIVER IMMUNOLOGY
00204* 00675 00678 00725 00726 01521 01527 02152
02184 02433* 02515* 02859* 02919* 02935 03343* 03740*
03831* 04259* 04277* 04281 04332 04341* 04342* 04343*
04350 04352 04354 04355 04358 04362 04366 04369
04372 04373 04375 04376 04380* 04390* 04392* 04636*
04646* 04647* 04691* 04721 05195 05257 05599 05639*
05657* 05659* 06132 06161* 06163* 06182 06469 07831*
09121* 10568* 10619
LIVER IN CHILDREN
00005* 00671 00702* 01519 01542 01551 01553 01572
02139 04660 06085 06095 06102 06103 06106 06160*
07849 07874 07876 07878 07882 08784 08785 08791
08810 09663 09682 09708 09719 10554* 10567* 10585*
LIVER INJURIES
00198* 00695* 00696* 00699* 01555* 01561 02491* 02492*
02493* 02495* 02499 02500 02507 02508 02509 02510
02836* 03412 03414 03415 03418 04267* 04325* 04326*
04389* 04423* 04659 05164 05187 05209* 05210* 05211*
05212* 05216 05217 05218 05219 05539* 05570 06060*
06091 06098 06099 06100 06101 06143* 06144* 06146*
06149 06150 06152 06972* 07352 07393 07893* 07895*
07903 08311 08826* 08830* 08837 09116* 09716* 09765
10021* 10036* 10075* 10076* 10585* 10609 10611 10647
10657 10660 10671* 10679 10704
LIVER INJURIES,ANESTHETICS IN
00700* 01569 03772 05209* 05551* 05555* 06148 07044
09118* 09715* 09898
LIVER INJURIES,ANTIBICTICS IN
07334* 07892* 09642*
LIVER INJURIES,CONTRACEPTIVE DRUGS IN
01565 01963* 02436* 02495* 02498 04661 07050* 07892*
08824* 09679 09710*
LIVER INJURIES,DIETARY DEFICIENCIES IN
02492* 05578 10610
LIVER INJURIES,DRUG-INDUCED
04324* 04329* 04331* 05209* 05210* 05211* 05212* 05213*
05216 05217 05218 05219 05233 05655* 06148 06150
06151 06152 06153 06154 06157 06158 07038* 07043*
07048 07416 08840 09651* 09717* 10672* 10674*

LIVER IRON METABOLISM
00651* 00657* 00740* 01201* 01552 04391* 05215* 05591
06072* 06073* 06194* 06329 06444* 06490 06539* 07100
07435 07481* 07836* 08812 10070* 10083 10575* 10677
10728*
LIVER LIPID METABOLISM
00210 00212 00213 01130 01131 01132 01133 01140
01152 01153 01192 01525 01957* 01996 01998 01999
02036 02425* 02435* 02469 02482 02849* 02851* 02852*
02856* 02868 02876 02877 03340* 03352* 03489* 03758*
03775 03787 03790 04263* 04660 04664 05541* 06195*
06327 06433* 06434* 06445* 06458* 06459* 06473 06476
06500 06501 06502 06505 07032 07042* 07137 07327*
07328* 07337* 07346* 07378 07394 07406 07417 07420
07422 07423 07424 07427 07429 07432 07841* 07971*
08127* 08226* 08227* 08234* 08239* 08277 09158 09162
10028* 10044* 10055* 10092 10767*
LIVER MANGANESE METABOLISM
06505
LIVER METABOLISM
00192* 00193* 00198* 00200* 00203* 00206* 00209 00699*
00728 00743 00744 00767* 01070* 01078* 01079* 01082*
01108 01121 01126 01127 01128 01129 01135 01498*
01526 01560* 01601* 01954* 01956* 01964* 01970* 01971*
01972* 01978 02000 02001 02004 02014 02015 02016
02017 02026 02029 02030 02031 02039 02040 02041
02042 02044 02432* 02448* 02458 02466 02467 02472
02475 02476 02497 02499 02513* 02560* 02834* 02835*
02837* 02858* 02860* 02862* 02863* 02867 02869 02879
02884 02886 03365 03385 03459* 03460* 03462* 03499
03746* 03749* 03753* 03754* 03756* 03759* 03761* 03762*
03770 03773 03778 03779 03782 03786 04387* 04401
04635* 04640* 04641* 04645* 04654 04657 04658 04662
04663 04665 04666 04668 05151* 05207 05262* 05266*
05538* 05542* 05545* 05553* 05555* 05558* 05560 05565
05568 05569 05570 05577 05578 05580 05582 05585
05586 05592 05596 06159 06181 06435* 06438* 06466*
06474 06480 06494 07318* 07360 07361 07365 07371
07374 07381 07386 07412 07413 07414 07415 07418
07426 07440 07863 08084* 08102 08170* 08230* 08233*
08239* 08248* 08264 08268 08275 08753* 08787 08833
09056 09130* 09156 09166 09633* 09709* 09972* 10027*
10038* 10039* 10061* 10064* 10078* 10571* 10651 10746
LIVER MICROORGANISMS
04264* 04277* 05159* 05180 05197 06130 06131 06132
06286
LIVER MORPHOLOGY
00004* 00005* 00018* 00029 00199* 00756 00897 00910*
00929 00930 00933 00934 01154 01522 01524 01809*
01822 01823 01824 01826 01827 01951* 01952* 01995
02012 02016 02024 02036 02083* 02091 02437* 02706*
02711* 02712* 02724 02727 03456* 03611 03750* 04521
04545* 05402* 05403* 06076* 06102 06131 06313* 06318
06319 06330 07213 07221 07223 07320* 07366 07859
08022 08088* 08098 08399 08996 09001* 09017 09020
09117* 09637* 09714* 10017* 10571* 10597 10676*
LIVER NECROSIS
01556* 01557* 01588 02471 02481 02485 03358 03397
03408* 03414 03605* 04305 04326* 04329* 04331* 05142*
05150* 05212* 05216 05225* 05241 05267* 06070* 06125
06157 07905 08763* 08827* 08842 10095 10567*
LIVER NEOPLASMS
01516 01519 02434* 02448* 06970* 06990 06995 07823*
07849 07878 07986 09657*
LIVER NEOPLASMS,BENIGN
05191 06083 06133 07881 10602
LIVER NEOPLASMS,MALIGNANT
00275* 00356 00651* 00652* 00671 00672 00673 00674
00675 00676 00679 01486* 01508 01509 01510 01511
01512 01513 01514 01515 01518 01521 01526 01977*
01992 02007 02146 06971* 06993 07027 07829* 07831*
07832* 07852 07870 07897* 08777 08818 08874 09653*
09672 09675 09691 09754 10555* 10556* 10615 10629
10658
LIVER NUCLEIC ACID METABOLISM
00208 01085* 01093* 01113 02435* 02569 02842* 02854*
02855* 02861* 02865 02885 02909* 03745* 03768 04297
04300 04643* 04656 05163 05460 05549* 05571 05573
05581 06097 06156 06441* 06468 06482 06504 07347*
07382 07388 07411 07441 07443 08217* 08222* 08263
08281 09132* 09140 10016* 10017* 10023* 10615 10750
LIVER NUCLEIC ACID SYNTHESIS
00212 01094 01149 01150 01151 03768 06462* 07316*
07335* 07379 08253
LIVER NUCLEIC ACIDS
01095 01096 02043 06322 06460* 07402 07410
LIVER PATHOLOGY
00671 01789 02426* 02483 03357 03397 03398 03412
04261* 05170 05179 05191 05194 05195 05208 05395
06958* 07038* 07042* 07043* 07048 07322* 07390 07489*
07844* 07860 07891* 08235* 08236* 08238* 08757* 08812
08842 09144 09660 09662 09711* 10072* 10557* 10566*
10567* 10579* 10583* 10613 10626 10674*
LIVER PERFUSION
00663* 02848* 02873 02877 03342* 03611 03779 04518
05153* 05177 05545* 06090 06119 06183 06455* 06969*
07329* 07373 07840* 08798 08851 09125* 09141 09640*
09746 10582* 10588* 10589* 10591* 10606
LIVER PHOSPHOLIPID METABOLISM
01997 02425* 05217 06334 06472 08226* 08234* 08251*
09137* 09147 09149 09651* 10020* 10045* 10092
LIVER PROTEIN METABOLISM
00693 02009 02010 02464 02469 02741* 02836* 02842*
02854* 02863* 03343* 03457* 03465 03763 03764 03769
03789 04267* 04275* 04312 04321 04334 04650* 04652*
05419 05455 05544* 05556* 05572 05573 05589 06314*
06321 06333 06434* 06441* 06459* 06499 06670 06986
07314* 07346* 07385 07396 07416 07901* 08237* 09155
09161 09165 09403
LIVER PROTEIN SYNTHESIS
01084* 01976* 01994 02005 02006 02007 02008 02011
02874 04647* 05544* 06462* 07316* 07334* 07358 07368
07376 07384 07434 07435 08229* 08253 08867* 09159
09160 10054* 10091
LIVER PROTEINS
00019* 00673 00750 01518 03452* 04655 07383
LIVER RADIOLOGY
SEE ALSO LIVER DIAGNOSIS
00328 01241 01242 01243 01704 02145 02487 02619*
02836* 02866 02914* 02929 02933 02940 02947 02948
02953 02955 02958 02959 02962 02982 02985 02986
02990 03344* 03360 03400 03479 03483 03823 03833*
03844 03845 03859 03862 04282 04283 04286 04291
04305 04692* 04708 05155* 05184 05202 05296* 05656*
05701 05702 05704 05705 05709 06087 06104 06116
06124 07003 07823* 07857 07678 07979* 08297 08299
08300 08327 08768* 08794 08806 09205* 09218 09224
09226 09655* 09887 10563* 10572* 10577* 10578* 10621
LIVER REGENERATION
00199* 00201* 00202* 00205* 01088* 01090* 01091* 01092*
01150 01151 01152 01153 01154 01977* 02045 02046
02461 02506 02510 02839* 02840* 02841* 02854* 02860*
02861* 02864* 02865 02866 03740* 03741* 03743* 03747*
03748* 03750* 03751* 03753* 03759* 03763 03765 03781
03787 04636* 04652* 04656 05539* 05545* 05549* 05556*
05558* 05561 05563 05571 05587 05593 06435* 06461*
06471 06478 06487 06492 06497 07038* 07147 07323*
07335* 07347* 07376 07378 07379 07443 07446 08217*
08258 08263 08828* 09111* 09119* 09148 09159 09164
09168 09632* 09638* 09908 10025* 10082 10087 10089
10090
LIVER RETICULOENDOTHELIAL SYSTEM
05404* 07314* 07319* 07843* 08765* 09506 10091 10623
LIVER RUPTURE
01503 04304 04468 06106 07006 07899* 07900* 08836
09706
LIVER SECRETION
03742* 06496 07370 10024* 10032* 10092
LIVER SERUM ENZYMES
SEE ALSO ALKALINE PHOSPHATASE
SEE ALSO LIVER DISEASE DIAGNOSIS
00274* 01050* 06443* 06526* 06558 06980 07367 07484*
07506 07822* 07831* 07834* 07934 10066* 10067* 10074*
10085 10574* 10629 10630 10631 10680* 10689* 10702
10811*
LIVER STEROID METABOLISM
01623* 03784 04353 06432* 07331* 07333* 07350* 07403
08231* 08276 10029* 10049*
LIVER SURGERY
00703 00773* 01484* 01502 01504 01507 02430* 02484
02509 02839* 02840* 02841* 02842* 02859* 02864* 02867
02915* 03339* 03347* 03348* 03349* 03350* 03356 03367
03368 03369 03370 03371 03373 03374 03384 03393
03453* 03454* 03471 03472 03741* 03776 03787 04257*
04265* 04268* 04276* 04279 04282 04284 04296 04299
04302 04318 04400 04656 05149* 05151* 05162 05166
05166 05181 05182 05185 05283 05286 05556* 05587
05630 06068* 06071* 06072* 06093 06096 06099 06100
06118 06138 06196 06963* 06971* 06997 07825* 07872
07876 07893* 07895* 07986 08782 08808 08828* 08837
08838 09011 09130* 09632* 09654* 09690 09716* 10552*
10556* 10572* 10595 10625 10649 10671* 10770* 10771*
10773*
LIVER TRACE ELEMENT METABOLISM
00006* 01499* 07364
LIVER TRANSPLANTATION
01483* 01485* 01507 01975* 02429* 02432* 02443* 02867
03349* 03356 03371 03393 03776 03831* 04270* 05158*
05182 05185 06959* 06973* 07425 07468 07838* 07845*
08250* 08761* 08767* 08827* 09119* 09124* 09183* 09194
09334 09631* 09641* 09654* 09675 10018* 10041* 10062*
10069* 10591* 10692* 10694*
LIVER TRAUMA
00676 00687 00703 01503 01504 02138 02150 02488
02510 02619* 02866 03414 03681* 03767 04303 04466
05164 05183 05187 05570 05629 06070* 06091 06099
06100 06336 06768 06994 08836 08838 08839 08997
09721 10650 10677 10678

LIVER TREATMENT
00698* 01505 01506 01568 01572 03404 05164 05168
05171 06065* 06090 06091 06098 06991 06992 07833*
07840* 07858 07879 07888 08792 08802 08811 08826*
08829* 09673 09687 09700 10588* 10589* 10599 10634
10652
LIVER TUBERCULOSIS
00680
LIVER ULTRASTRUCTURE
00019* 00020* 00201* 00202* 00655* 00656* 00658* 00660*
00661* 00700* 00908* 00909* 00931 00932 01082* 01511
01523 01535 01565 01571 01585 01672* 01797 01808*
01809* 01825 01826 01827 01968* 02013 02014 02023
02025 02027 02031 02426* 02427* 02428* 02460 02471
02511* 02710* 02711* 02723 02725 02726 02741* 02837*
02846* 02847* 02856* 02882 02888* 03340* 03405* 03406*
03409* 03415 03424* 03440 03603* 03605* 03613 03615
03616 03644* 04260* 04261* 04297 04324* 04326* 04328*
04335 04349* 04363 04501* 04506* 04512 04514 04516
04518 04519 04520 04524 04525 04529 04635* 05146*
05150* 05208 05213* 05222* 05272* 05401* 05404* 05419
05421 05423 05424 05429 05455 05459 05555* 05565
05571 06127 06140 06150 06152 06163* 06169* 06320
06321 06323 06324 06434* 06438* 07228 07229 07231
07234 07312* 07313* 07319* 07320* 07325* 07393 07394
07407 07902 07911* 07922* 07959* 08066* 08076* 08079*
08081* 08084* 08101 08215* 08262 08753* 08825* 09009
09010 09110* 09113* 09135* 09152 09154 09893* 09899
09905 10021* 10027* 10036* 10042* 10052* 10053* 10056*
10058* 10065* 10085 10567* 10583* 10611 10657
LIVER UREA METABOLISM
06436* 10019* 10598
LIVER ZINC METABOLISM
05263* 09012
LIVER,AGE EFFECTS ON
00004* 00005* 00006* 03347* 05175 06327 06471 06487
07330* 07340* 07353 07354 07363 07392 07416 07886
08258 08262 08273 09001* 09020 09126*
LIVER,ALCOHOL EFFECTS ON
00661* 00737* 00738* 00741* 00742 00743 00744 00746
00753 01558* 01566 01567 01606* 01619 01973* 01974*
02036 02037 02038 02425* 02445* 02451* 02475 02494*
02496 02559* 03407* 03416 03417 03458* 03780 04325*
04326* 04327* 04328* 04390* 04392* 04394* 04635* 04650*
04654 05210* 05214* 05272* 05280 05589 06147 06149
06155 06159 06445* 07028 07040* 07045 07100 07317*
07345* 07348* 07355 07394 07508 07856 07861 07896*
07958* 08226* 08277 08282 08803 08823* 08856 08867*
09056 09107* 09113* 09638* 09643* 09649* 09684 09722
09787 10027* 10038* 10042* 10043* 10044* 10051* 10072*
10076* 10583* 10633 10635 10673* 10675* 10738* 10806*
10838
LIVER,AMEBIASIS EFFECTS ON
00895 05203 07199 08069 09649* 09658* 09884 09885
09887 09890
LIVER,DISEASES ASSOCIATED WITH
00654* 00670 00678 00755 01485* 01489* 01491* 01494*
01497* 01515 01525 01542 01543 01549 01655* 02107*
06079 06186* 06988 06989 07854 08804 08805 08977
09414 09481* 10564* 10609 10627 10639 10644 10660
LIVER,DRUG EFFECTS ON
00192* 00211 00688 00696* 00697* 00704 01066* 01084*
01087* 01089* 01098 01099 01117 01119 01143 01144
01174* 01181 01490* 01499* 01522 01523 01540 01550
01556* 01557* 01558* 01559* 01560* 01562 01563 01564
01565 01971* 01977* 02021 02034 02460 02490* 02491*
02492* 02493* 02497 02498 02500 02503 02504 02505
02506 02507 02508 02560* 02710* 02837* 02842* 02846*
02847* 02848* 02860* 02865 02873 02883 02885 02933
03405* 03409* 03420* 03603* 03615 03616 03743* 03745*
03746* 03747* 03748* 03768 03769 03770 03772 03773
03777 03781 04018* 04335 04337 04338 04339 04340
04386* 04501* 04643* 04644* 04660 04661 04663 04666
04668 05209* 05211* 05401* 05543* 05547* 05548* 05550*
05557* 05558* 05576 05582 05584 05590 06440* 06461*
06463* 06478 07016 07032 07041* 07042* 07043* 07047
07319* 07323* 07325* 07336* 07337* 07338* 07345* 07360
07419 07578* 07891* 07892* 07901* 08237* 08243* 08245*
08276 08775 08819 08825* 09102* 09152 09801* 10016*
10033* 10034* 10043* 10050* 10051* 10065* 10070* 10721
LIVER,DRUG TREATMENT OF
00664 00733 01532 02453 02494* 02501 02514* 02561*
02563* 02564* 03358 03404 03407* 03418 03486 04280
04281 04285 04319 04364 04370 05143* 05201 05254*
05256* 06092 06103 06144* 06160* 06166* 06178 06185*
06202 06957* 07019 07846* 07894* 08820 09634* 09646*
09671 09699 09885 10588* 10717* 10727*
LIVER,EXPERIMENTAL STUDIES OF
00192* 00211 01533 01625* 02046 06065*
LIVER,FATTY
00272* 00656* 00659* 00697* 00756 01490* 01537 01539
01540 01541 01542 01543 01564 01600* 01606* 01619
01657* 02427* 02435* 02469 02475 02503 03338* 03340*
03406* 03456* 04331* 04401 04404 04405 04698* 05113
05143* 05150* 05188 05191 05198 05214* 05215* 05272*
05278 06076* 06147 06200 06445* 06960* 06961* 07032
LIVER,FATTY
CONTINUED
07042* 07096 07317* 07345* 07346* 07367 07841* 07856
07861 07877 07894* 08227* 08273 08277 08774 09128*
09133* 09135* 09137* 09201* 09636* 09643* 09718 09894*
10042* 10051* 10072* 10560* 10564* 10598 10635 10659
10676*
LIVER,HORMONAL CONTROL OF
01102 01112 01123 01124 01126 01142 01146 01558*
01952* 01960* 01961* 01986 02040 02041 02472 02498
02839* 03743* 03761* 04273* 04387* 04501* 04644* 04666
05138* 05575 06451* 07310* 07318* 07344* 07385 07442
07444 07901* 08213* 08260 09133* 09664 09669 10019*
10024* 10028* 10039* 10090 10100*
LIVER,NERVOUS CONTROL OF
00209 01823 04393* 05277 05402* 09163
LIVER,RADIATION EFFECTS ON
01555* 06478 06479 06485
LIVER,TOXIC EFFECTS ON
00191* 00197* 00198* 00219 00222 00705 01087* 01088*
01089* 01092* 01093* 01147 01556* 01557* 01558* 01559*
01567 01568 01569 01570 01974* 01979 02008 02023
02024 02025 02026 02027 02028 02029 02030 02032
02035 02491* 02492* 02493* 02493* 02496 02497 02499
02500 02501 02503 02504 02506 02507 03405* 03406*
03408* 03409* 03410 03411 03412 03413 03417 03418
03419 03603* 04295 04333 04334 04335 04336 04337
04338 04339 04340 04389* 04391* 04423* 04659 05147*
05210* 05211* 05212* 05213* 05214* 05216 05217 05218
05219 05538* 05555* 05558* 05655* 06110 06143* 06144*
06146* 06147 06148 06149 06150 06151 06152 06153
06154 06155 06157 06158 06313* 06325 06331 06432*
06433* 06438* 06442* 06443* 06446* 06456* 06457* 06476
06500 06501 06502 06608* 07016 07039* 07046 07047
07084* 07312* 07313* 07320* 07322* 07327* 07334* 07336*
07340* 07352 07362 07390 07824* 07867 07883 07891*
07894* 07898* 07901* 07902 07903 08079* 08111 08127*
08227* 08228* 08231* 08235* 08236* 08238* 08245* 08249*
08825* 08827* 08831 08833 08841 08843 09102* 09103*
09106* 09107* 09121* 09135* 09144 09167 09642* 09714*
09718 09720 09723 10022* 10028* 10031* 10048* 10054*
10055* 10056* 10058* 10066* 10070* 10095 10642 10646
LIVER,VITAMIN B12 IN
00710* 01531 07354 10081
LUPOID HEPATITIS
07041*
LYMPH
01034* 04332 08016*
LYMPH CIRCULATION
03614 04235* 04395* 07726* 08016* 09618* 09701 09826
09933*
LYMPH NODES
03824 03910* 04111* 04684 05078 05085* 06738*
LYMPHADENITIS,MESENTERY
00869 03560 08448 08549 09870
LYMPHANGIECTASIA
04481 04952 04980 08544 09512*

LYMPHANGIOMA
00561
LYMPHATIC SYSTEM
00067* 00767* 01371* 01703 01704 01705 01707 01766
01955* 02190* 02289* 02330* 02424 07244* 07586* 08106
08182* 08598 09018 09850* 09933*
LYMPHOGRAPHY
02947 02961 07003
LYMPHOGRAPHY IN CANCER DIAGNOSIS
10493
LYMPHOGRAPHY,GASTROINTESTINAL
08301
LYMPHOMA
00508* 00845 01313 06967* 07151* 07708* 08408 08588
09479* 09505 09851* 10416 10472 10813*
LYMPHOSARCOMA
01388 08948

MACROGLOBULINEMIA
04383 04972*
MAGNESIUM
00150* 00871 00953* 01078* 02706* 10156 10610
MAGNESIUM ABSORPTION
04087 08625
MAGNESIUM METABOLISM
07192 08520*
MALABSORPTION
SEE ALSO SMALL INTESTINE
00508* 00559 00560 01409 01669* 02339 03061* 03150*
03189* 03190* 03191* 03192* 03193 03194 03195 03196
03197 03198 03200 03204 03584 04021* 04082* 04085
04088 04089 04090 04092 04093 04094 04096 04100
04101 04919* 04926 04957 04971* 04978* 04979 04981
04982 04985 04991 04993 04995 05002 05003 05099*
05123* 05338* 05915* 05927* 05929* 05931 05933 05934
05935 05936 05937 05940 05941 05942 06260* 06828
06829 06831 07706* 07719 07722 08625 08637 08638

MALABSORPTION
CONTINUED
08755* 09482* 09486 09487 09503 09840* 10414*
MALABSORPTION DIAGNOSIS
00261* 00262* 00264* 00314 01207* 01225 02126 02336*
03201 04091 04974* 04990 05005 05930* 05939 07656*
07709* 08413 08616* 08632 08641 09200* 10390* 10407*
10410* 10420
MALABSORPTION DIAGNOSIS,BIOPSY IN
00263*
MALABSORPTION DIAGNOSIS,TOLERANCE TESTS IN
00549*
MALABSORPTION DIAGNOSIS,XYLOSE IN
02101* 02102* 02103* 02125 06816* 08064* 08624 10413*
MALABSORPTION EPIDEMIOLOGY
00545* 00546* 01410 03194 04080* 04984 04987 04992
05000 05921* 09486 10398* 10409* 10503*
MALABSORPTION ETIOLOGY
01407 01782* 03185* 03187* 03188* 04077* 04079* 04083*
04914* 04970* 04972* 04976* 04977* 05141* 05447* 06290*
08620* 08621* 10425
MALABSORPTION IMMUNOLOGY
04970* 04972* 04976* 05001 10411*
MALABSORPTION IN CHILDREN
00261* 00263* 00553* 01661* 02102* 02103* 02328* 02343
03201 04078* 04087 04097 04098 04099 04977* 04980
04983 04986 04989 04998 05000 05004 05925* 05928*
05938 05939 06044 06816* 06822 06827 07714* 07715
07718 08626 08629 08634 09493 10257 10425
MALABSORPTION PATHOLOGY
05932 05949*
MALABSORPTION PATHOPHYSIOLOGY
05924* 07184 08616* 08639 09490 10406*
MALABSORPTION TREATMENT
01397* 02328* 02618* 04996 04997 05141* 05863* 05938
09490
MALABSORPTION TREATMENT,ANTIBIOTICS IN
07712* 10114* 10406*
MALABSORPTION TREATMENT,DIETARY
00553* 06818* 06827 07709* 08613 08889 08932* 09504
10414*
MALABSORPTION TREATMENT,FOLIC ACID IN
10389*
MALABSORPTION-INDUCED BONE DISEASES
01656*
MALABSORPTION,BLIND LOOP-INDUCED SECONDARY
07251* 07710* 08125* 08569 09845* 10114*
MALABSORPTION,DIETARY DEFICIENCIES IN
07718 08520* 10421
MALABSORPTION,DISEASES ASSOCIATED WITH
00548* 00550* 00561 00563 00564 00647 00692 00694
01394* 01395* 01396* 01398* 01399* 01400* 01401 01406
01408 01668* 01684* 02288* 02326* 02328* 02329* 02330*
02331* 02332* 02333* 02334* 02335* 02342 02343 02409*
02618* 05927* 05929* 05946* 07954* 08617* 08628 10422
10424 10782 10814*
MALABSORPTION,GASTRECTOMY-INDUCED
02268* 07626* 07720 08932* 10414*
MALABSORPTION,INTESTINAL RESECTION-INDUCED SECONDARY
06737* 06786 06818* 07705* 08520* 10418
MALABSORPTION,MICROORGANISMS IN
07251* 07710* 07722 07954* 08577 08619* 09841* 10114*
10405* 10413* 10415*
MALABSORPTION,PARASITIC DISEASE-INDUCED SECONDARY
08064* 08999 10198* 10858*
MALABSORPTION,PRIMARY
09491
MALABSORPTION,SECONDARY
06811* 08519* 08542 08544 08619* 08623* 08627 09472*
09479* 09502 09505 09506 10416 10814*
MALABSORPTION,VITAMIN DEFICIENCIES IN
01670* 10348 10406*
MALIGNANT ABDOMEN NEOPLASMS
01723 09479* 09851*
MALIGNANT ANUS NEOPLASMS
00585 07732 07735 07743 07759 08697 09533 09534
MALIGNANT BILIARY TRACT NEOPLASMS
00612* 00762* 00779 00846 01630 02178 07107* 08008
08923 09793* 09800* 09808* 09814 10643 10764* 10796
MALIGNANT DUODENUM NEOPLASMS
00846 02298 02303 06791 07660 07684 07686 08581
08593 08729 09451 09457 10371
MALIGNANT ESOPHAGUS NEOPLASMS
00361* 00362* 00363* 00376 01287 01290 02199 02200
02201 07548 07569 08339 08343 08347 08372 08373
08383 09243* 09244 09258 09259 09260 09268 09276
10189 10193
MALIGNANT GALLBLADDER NEOPLASMS
00332 00612* 00762* 00778 00779 07144 07972* 08001
08006 08890 08914 09800* 10786
MALIGNANT GASTROINTESTINAL NEOPLASMS
00577 00845 01296* 01721 01722 01726 01727 01729
01730 01733 02218* 02377 06527* 06639 07693 08955
08956 09228 09230 10489 10834
MALIGNANT LARGE INTESTINE NEOPLASMS
00265* 00567* 00578 00581 00582 00583 00607 01415*
01416* 01423 01424 01425 01426 01427 01429 01431
01432 01433 01434 01435 01436 01439 01440 01678*
02344* 02345* 02346* 02348* 02349* 02350* 02351* 02352*
02360 02361 02369 02370 02371 02373 02374 02375
02376 02378 02379 02389 02398* 06836* 06844 06846
06848 06863 06871 07736 07743 07753 07756 07769
07781 07787* 07834* 08650* 08651* 08658* 08661* 08675
08698 08700 08705 09508* 09516* 09518* 09523* 09528*
09561 09586* 10427* 10438* 10447 10446 10473
MALIGNANT LIVER NEOPLASMS
00275* 00356 00651* 00652* 00671 00672 00673 00674
00675 00676 00679 01486* 01508 01509 01510 01511
01512 01513 01514 01515 01518 01521 01526 01977*
01992 02007 02146 06971* 06993 07027 07829* 07831*
07832* 07852 07870 07897* 08777 08818 08874 09653*
09672 09675 09691 09754 10555* 10556* 10615 10629
10658
MALIGNANT MESENTERY NEOPLASMS
08974
MALIGNANT PANCREAS NEOPLASMS
00265* 00627* 00631 00632 00633 00634 00635 00636
00637 00846 00847 01464 01465 01466 01467 02408*
02411 02412 06927* 06938 07793* 07800 08025 08729
08732 08736 09599* 09609 10508* 10510* 10512* 10523
10529 10530
MALIGNANT RECTUM NEOPLASMS
00584 00585 00607 02130 02351* 02376 02390 02391
06836* 06844 06846 06889 07733 07735 07743 07753
07759 07775 08697 09508* 09518* 09559 09568 10429*
10437* 10447 10456 10473
MALIGNANT SALIVARY GLAND NEOPLASMS
00762* 01725
MALIGNANT SMALL INTESTINE NEOPLASMS
00508* 00511 00516 00518 00519 00543 01383 01384
01385 01386 01387 01388 02292 02293 02295 02296
02301 02325 06764 06767 06771 06772 06787 06810
07653* 07681 07708* 08570 08580 08588 08594 09443
09470 10370 10377
MALIGNANT STOMACH NEOPLASMS
00293 00363* 00389* 00390* 00391* 00396 00397 00399
00400 00401 00403 00404 00474 01287 01297* 01304
01305 01306 01307 01308 01309 01310 01311 01313
01314 01315 01316 02113 02114 02172 02217* 02218*
02219* 02224 02225 02227 02228 02229 02230 02231
02232 02292 06622 06635 06636 06656 06680* 06687*
07487* 07585* 07593 07594 07599 07604 07606 07632
08025 08388* 08390* 08397 08408 08432 08434 08435
08445 09244 09258 09292* 09298* 09300* 09301* 09306
09311 09314 09325 09339 09340 09344 09350 09372
09415 10189 10216 10217 10224 10225 10226 10230
10249
MALLORY-WEISS SYNDROME
04792 04838 05774* 06593 08308 08357 10236
MALNUTRITION
00505* 00563 00871 01405 01661* 01764 01765 01767
01768 02650 02652 02669 03202 03554 03578 03584
03909* 04086 04088 04789 04828 04982 04998 04999
05429 05938 07197 07710* 07713* 07720 08042 08741*
08880 10561*
MANGANESE ABSORPTION
05464 09938*
MANGANESE METABOLISM,LIVER
06505
MANOMETRY,ESOPHAGUS
02992* 03682* 03690 05466* 05719 06589 07535* 07552
07568 08336* 09237* 09241* 09270 09272
MARASMUS
01657* 02650 05766* 05938 06262* 08042
MARKER STUDIES
00337 02743* 02925 02926 02936 02940 02970 02985
02986 02990 03155 03227* 03626* 03668* 03671* 03760*
04504* 04548* 04687 04698* 04701* 05338* 05451* 05453*
05586 05647* 06124 06354* 06541* 06552 06606* 09045
MECKELS DIVERTICULUM
00309 00521 01223 01374 02305 04029 04932 04933
05411* 05910 06783 06796 07666 07674 07695 08530*
08547 08572 08587 08592 09462 10332* 10346 10347
10351 10352 10354
MECONIUM ILEUS
04015* 04017* 04033 04458* 05333* 06043 06944 08672
10520
MEDIA,CONTRAST
02920* 02929 02944 02947 02963 02974 02979 03647*
03834* 03846 03853 03854 03863 04105* 04509* 04707
05292* 05636* 05660* 05688 05982 06036* 06054 06067*
07205* 08011* 08264 08331 08900 09136* 09218 09229
09240* 10577*
MEGACOLON
00589 00599 02383 02384 02385 02400* 03268 03277
04129 04198 05087 05944* 05957* 05974 05978 05991
06005 06015 06860 06874 06891 07725* 07752 10441*

MEGAESOPHAGUS
00374 01282 03032 03038 03043 05884 06603 07550
08373 08379
MELENA
01389 03546* 03552 08965 09329 09423* 09839* 10333*
10334* 10818*
MENETRIERS DISEASE
00417 00418 02244 02245 03051* 03953 04811 05779
06650
MERCURY
01837* 01838* 04538*
MESENTERY ANGIOGRAPHY
02176 05698 06529* 06557 07526 07890 08712 08720
09428* 09704 10127 10147 10150 10333* 10386 10550
10570* 10818*
MESENTERY ANOMALIES
05380 06545
MESENTERY CIRCULATION
02176 02318 04471 04472 06521 06765 07525 08527*
09172* 09180* 09191* 09880 10331*
MESENTERY CYSTS
01719 04111* 07167 07176 08034
MESENTERY DIAGNOSIS
02104* 02176 05686 05687 07167 07525
MESENTERY DISEASES
04474 08584
MESENTERY LYMPHADENITIS
00869 03560 08448 08549 09870
MESENTERY NEOPLASMS
04053 05929* 10150
MESENTERY NEOPLASMS,BENIGN
08043
MESENTERY NEOPLASMS,MALIGNANT
08974
MESENTERY RADIOLOGY
05686 07173
MESENTERY SURGERY
04473
MESENTERY TREATMENT
10344*
MESENTERY VASCULAR DISEASES
01693 02625 04028 04465 04471 04472 04473 04476
04929 04945 04966* 05870 05890 06779 07654* 07727*
08028 08551 09186* 09428* 09429* 09467 09628 09877
10127 10147 10331* 10344* 10361 10386 10810* 10818*
METABOLIC BALANCE STUDIES
06354* 06819* 07317* 07619* 07794* 10730*
METABOLIC CHANGES IN CANCER
08800
METABOLIC CHANGES IN CIRRHOSIS
01560* 05284 07092* 07955* 07964 07969 08865* 08866*
08867* 08872 09122* 09782* 09784 09788 10026* 10575*
10731* 10732* 10733* 10741 10744 10746 10748 10753
10757
METABOLIC CHANGES IN HEPATITIS
07083 07911* 07913* 07914* 07915* 09745 09764 09774
METABOLIC CHANGES IN LIVER DISEASES
01966* 06966* 07013 07330* 07842* 08800 08812 09128*
09697 09894* 10641 10648 10659
METABOLIC CHANGES IN PANCREATITIS
06953* 07807* 09618* 10537* 10542 10551
METABOLIC CHANGES IN PEPTIC ULCERS
09410 10290
METABOLIC CHANGES,GASTRECTOMY-INDUCED
06615* 06670 10301
METABOLISM IN CIRRHOSIS,ELECTROLYTE
07092* 07968
METABOLISM IN CIRRHOSIS,WATER
07092* 07968
METABOLISM IN GASTROINTESTINAL TRACT,ELECTROLYTE
06356 10833
METABOLISM,ACID
02903
METABOLISM,ALCOHOL
00392* 04677* 06440* 07341* 07345* 07431 07453* 07896*
07958* 09128* 09972*
METABOLISM,AMINO ACID
00151* 00216 00575* 01105 01663* 02018 02055* 02891*
04602* 05522 08194 08209 09858
METABOLISM,BILE
01137 01138 01139 03646* 04637* 08128* 08884*
METABOLISM,BILE ACID
02571* 03459* 03744* 03752* 03774 04412* 04638* 05640*
06218* 06437* 07311* 07331* 07332* 07333* 07971* 07978*
08240* 08285* 08589 08755* 09112* 09120* 10765*
METABOLISM,BILE SALT
04648* 08521* 10020* 10120* 10586*
METABOLISM,BILIRUBIN
00226 00228 01066* 01067* 01068* 01069* 01491* 01492*
01965* 02478 02835* 02848* 03783 06103 07140 07338*
07481* 07830* 07835* 07853 08214* 08220* 08244* 08266
09126* 10061* 10073*
METABOLISM,CALCIUM
00084 02067 02068 02092 02892* 06611* 07583* 08537
08625 09918* 10117*
METABOLISM,CANCER
07316* 07417 07793* 08786 08801 09664
METABOLISM,CARBOHYDRATE
00233 01192 01287 03112 05560 05605* 06513* 06645
06664 06812* 07239* 07428 07452* 07457 07463 07842*
07880 07969 08108 08614* 09006 09424* 09915* 10731*
METABOLISM,CATECHOLAMINE
03767 08956 09091* 09646*
METABOLISM,CHLORIDE
07150* 09856 09865
METABOLISM,CHOLESTEROL
01955* 02050* 02571* 02574* 02896* 03497* 04412* 06423*
07788* 07973* 09489 10086 10129 10130
METABOLISM,COPPER
02440* 03749* 06113 06162* 06957* 07461 07889 08159
METABOLISM,DRUG
00955* 03635* 04162 06449* 07243* 07391 08241* 08242*
10004* 10648 10844
METABOLISM,DRUG EFFECTS ON
01980 02008 02071
METABOLISM,ELECTROLYTE
02406 02442* 02736* 02737* 05352 06506* 07185 07665
08716 09163 10741
METABOLISM,FAT
00066*
METABOLISM,FATTY ACID
00978 01100 01124 01990 02078 03790 05214* 05560
05585 05609* 05934 06292 07255*
METABOLISM,GLUCOSE
00492 01164 01607* 01660* 06615* 07239* 07321* 07964
08522* 08861 09913* 09914* 10051* 10119* 10519
METABOLISM,HEMOGLOBIN
01581* 10536*
METABOLISM,HORMONE
00214 00215 03454* 03785 05262* 08183* 08230* 08239*
08276 09166 10037* 10078* 10290 10840
METABOLISM,IRON
00036* 00037* 02684 02901 04012 04988 05215* 05855
06073* 06162* 06359 06739* 07869 09036
METABOLISM,LIPID
01036* 01191 01853 02063 02064 02428* 02838* 03812
03830* 05580 05585 06064* 06423* 06424* 06425* 07204*
07209* 07372 07380 07421 07424 07453* 07465 07718
08105 08251* 08273 09006 09031 09105* 09114* 09410
METABOLISM,MAGNESIUM
07192 08520*
METABOLISM,NUCLEIC ACID
04555 06290* 06497 07448* 07458 09176 09713*
METABOLISM,PHOSPHOLIPID
00177* 07420 10014* 10551
METABOLISM,POTASSIUM
07150* 10024* 10158*
METABOLISM,PROTEIN
00048* 01929 02079* 02741* 02891* 02892* 03797* 05589
05597 05606* 07191 07462 08135 08939* 09095 10014*
10096 10111 10113* 10123* 10401* 10542
METABOLISM,STEROID
03639*
METABOLISM,TRACE ELEMENT AND MINERAL
06418 07794* 08259
METABOLISM,VITAMIN
06349* 08127*
METABOLISM,WATER
01080* 01161* 06430 06506* 07185 07252* 07665 08018*
10741 10808*
METABOLITES,URINARY BILE
07332* 07830* 08328
METABOLITES,URINE
00232* 01531 06498 08781
METASTATIC CANCER
00391* 00407 00583 00633 00634 00672 00679 01382
01416* 01425 01427 01438 01466 01509 01512 01513
01514 01520 01727 02149 02227 02292 02411 06540*
06558 06993 06996 07107* 07834* 08339 08396 08651*
08658* 08699 08875 08918 09298* 09340 09657* 09667
10217 10427* 10565* 10574* 10626
MICROORGANISMS
SEE ALSO AMEBIASIS
SEE ALSO CHOLERA
SEE ALSO GNOTOBIOSIS
SEE ALSO LEPTOSPIROSIS
SEE ALSO SALMONELLOSIS
SEE ALSO SHIGELLOSIS
05153*
MICROORGANISMS IN MALABSORPTION
07251* 07710* 07722 07954* 08577 08619* 09841* 10114*
10405* 10413* 10415*
MICROORGANISMS,BILE
07977*
MICROORGANISMS,BILIARY TRACT
00777* 02580* 03500 03501 06245 07133 07974* 10768*
MICROORGANISMS,ESOPHAGUS
03039 07536* 07540*

MICROORGANISMS,GASTROINTESTINAL
00234 01167 01168 01185 01679* 01777 01778 02072
02073 02086* 02332* 02610* 02643 02644 02661 02676
02683 02686 02909* 03555 03571 03581 03583 04486
04494 05129 05344 05345 05608* 06256* 06266 06275
06287 06288 08027 08045 08285* 08288 09297* 10112*
10123* 10738*
MICROORGANISMS,LARGE INTESTINE
00594 00595 01415* 02052* 02352* 02365 02607* 02614*
03222* 03300 04106* 04134 04148 05020* 05084 05613
05614 05943* 05971 06007 06514* 07466 08285* 08578
08986* 09182* 10115* 10125* 10553*
MICROORGANISMS,LIVER
04264* 04277* 05159* 05180 05197 06130 06131 06132
06286
MICROORGANISMS,SMALL INTESTINE
00535 00536 00537 00551* 00990* 01680* 02052* 02098*
02284* 02287* 02607* 02609* 02889* 03124* 04081* 04082*
04085 04089 04134 04677* 04682 04683 04979 05348
05398 05608* 05631 05637* 05640* 07456 07466 07476*
07658* 07954* 08287 08578 08986* 09182* 09604 09841*
09845* 10114* 10115* 10415*
MICROORGANISMS,STOMACH
05793 06402* 08419 09327 10131
MICROSCOPY,ELECTRON
00480 00536 00551* 00636 10125*
MILK INTOLERANCE
00552* 00558 01396* 01410 01661* 02326* 02327* 02337
03193 04984 04985 04997 05004 05921* 05923* 05928*
05940 09492 09495 10400* 10409* 10412* 10425 10853
MINERAL ABSORPTION
SEE TRACE ELEMENT AND MINERAL ABSORPTION
MINERAL ABSORPTION,TRACE ELEMENT AND
01833* 01837* 01838* 01839* 07257
MINERAL DEFICIENCIES,TRACE ELEMENT AND
00934 01096 01673* 01759 02011
MINERAL METABOLISM,TRACE ELEMENT AND
06418 07794* 08259
MITOSIS
04684 06415* 07380 09093 09908 09954* 10087 10089
MOTILITY
SEE SMOOTH MUSCLE
MOTILITY PRESSURE STUDIES
SEE ALSO ANUS MOTILITY
SEE ALSO BILIARY TRACT MOTILITY
SEE ALSO ESOPHAGUS MOTILITY
SEE ALSO GALLBLADDER MOTILITY
SEE ALSO GASTROINTESTINAL MOTILITY
SEE ALSO LARGE INTESTINE MOTILITY
SEE ALSO SMALL INTESTINE MOTILITY
SEE ALSO STOMACH MOTILITY
00981* 00986* 01179 01274* 01470* 01874 01875 01889
02187* 02263* 02381 03681* 04586 06376* 06378* 08136*
08336* 09798* 09823 09944* 09947* 09958* 10138* 10152
10759* 10791
MOTILITY,ANUS
08660*
MOTILITY,BILIARY TRACT
00090* 00108 00109 00342 01889 02763* 02764* 02765*
02911* 03506 03692 04445 04563* 04571* 04572* 06395
06396 06397 06452* 07104* 07105* 07265* 07349* 08927
09127* 09189* 10758*
MOTILITY,DRUG EFFECTS ON
00095* 00098* 00118 00980* 00982* 00985* 00987* 00989*
00999 01003 01004 01005 01332* 01333* 01859* 01860*
01862* 01863* 01865* 01867* 01868* 01869* 01871* 01877
01889 01891 01899 01901 02127 02772 02775 02776
02779 03675* 03678* 03685 03686 03687 03691 04562*
04563* 04564* 04566* 04567* 04568* 04569* 04570* 04572*
04573* 04575* 04576* 04580* 04583 04585 04588 04590
05467* 05469* 05478 05480 05486* 05865* 06370* 06375*
06390 06391 06395 09942* 09955* 09956* 09961*
MOTILITY,DUODENUM
00430 01863* 01865* 01886 02757* 08144 09946* 09947*
09952* 09957* 09962 10349
MOTILITY,ESOPHAGUS
00087* 00099 00100 00980* 00981* 00993 00994 01193*
01194* 01859* 01874 01875 02263* 02664 02752* 02753*
02766 02767 02768 02769 02772 02965* 02994* 03000*
03024 03666* 03667* 03682* 03688 03690 04561* 04564*
04565* 04586 04587 04723* 04725* 04726* 04727* 04729*
04733* 04745 04747 04765 05466* 05472 05473 05757
05758 06605 07519 08136* 08145 08332* 09243* 09965
MOTILITY,GALLBLADDER
00089* 01865* 02762* 02778 02967 03186* 04563* 04576*
06377* 06378* 10795
MOTILITY,GASTROINTESTINAL
00074 00107 00117 00119 00120 00121 00247 00531
00985* 01007 01659* 01870* 01871* 01872* 01882 01884
01895 01896 01897 01898 01900 01901 02287* 02628
02640 02761* 02779 02780 02904* 03595 03685 03691
04581* 04608* 04817 05474 06391 06392 07206* 07275
07276 08030 08150 09047 09578 09840* 09959*
MOTILITY,HORMONAL CONTROL OF
00097* 00119 01900 06373* 07271*
MOTILITY,LARGE INTESTINE
00097* 00098* 00115 00116 00569* 00570* 00992* 01001
01002 01003 01004 01005 01006 01860* 01868* 01869*
01873* 01888 02354* 02357* 02761* 03672* 03678* 03679*
03680* 03689 04107* 04113* 04580* 04585 04588 05052
05475 05476 05477 05478 05481 05483 05688 05957*
05967 05988 06376* 06393 06394 07264* 07266* 07267*
07269* 07757 09037* 09041 09044 09045 09924* 09942*
09943* 09945* 09955* 09956*
MOTILITY,NERVOUS CONTROL OF
00101 03668* 03669* 03670* 04579* 05469* 05474 05479
05486* 06367* 07279 09953* 09959*
MOTILITY,RECTUM
00122 01006 01421* 01894 03694
MOTILITY,SMALL INTESTINE
00091* 00093* 00094* 00096* 00097* 00106 00110 00111
00112 00113 00118 00597 00986* 00987* 00988* 00989*
00990* 00997 00998 00999 01000 01001 01817 01864*
01866* 01867* 01881 01883 01887 01890 01891 01892
01893 02127 02288* 02721 02758* 02759* 02760* 02761*
02773 02774 02775 02776 02777 02778 02913* 03668*
03672* 03673* 03674* 03675* 03676* 03677* 03684 03686
03687 03692 03693 03909* 04020* 04022* 04562* 04566*
04567* 04568* 04569* 04573* 04574* 04575* 04578* 04579*
04582* 04584 04589 04591 04923 04936 05412* 05414*
05470* 05480 05482 05628* 06370* 06371* 06372* 06373*
06374* 06375* 07270* 07278 07279 08141* 08519* 09037*
09041 09044 09551 09942* 09943* 09945* 09949* 09950*
09951* 09958* 09960*
MOTILITY,SMOOTH MUSCLE
02987 09051
MOTILITY,STOMACH
00088* 00103 00104 00105 00106 00163 00475 00983*
00984* 00995 00996 00997 00998 00999 01009* 01016*
01352* 01860* 01861* 01862* 01863* 01865* 01878 01879
01880 01881 01883 01886 01887 01888 01915* 02079*
02080* 02081* 02264* 02754* 02755* 02756* 02757* 02761*
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03667* 03668* 03669* 03670* 03671* 03673* 03683 03692
03702* 03818* 03832* 03911* 03942 03993 04566* 04567*
04577* 04578* 04579* 04583 04589 04590 04780* 04814
04822 04910 05467* 05468* 05469* 05473 05479 05486*
05767* 06366* 06369* 06375* 06382 06383 06384 06386
06387 06388 06533* 06610* 07263* 07268* 07271* 07272
07273 07274 07277 07278 07279 07534* 07602 08129*
08137* 08138* 08140* 08144 08145 08147 08149 08425
08462 09039* 09042 09043 09048 09049 09050 09365
09944* 09946* 09947* 09948* 09957* 09961* 09963 09990*
10285*
MUCOPOLYSACCHARIDES
00016* 01361 06140 07826* 08086*
MUCOPROTEINS
06526*
MUCOSA,DUODENUM
03487
MUCOSA,ESOPHAGUS
02718 05489* 10168
MUCOSA,GALLBLADDER
00031 07339* 09805*
MUCOSA,GASTROINTESTINAL
00010* 00234 01811 01848 01849 01850 02907* 03600
04498 06305* 08091 09013 10826
MUCOSA,LARGE INTESTINE
00420 00888 00892 01428 01429 02350* 02351* 02362
02895* 03214* 03272 05013* 06511*
MUCOSA,ORAL
10389*
MUCOSA,RECTUM
02387 02390 04558
MUCOSA,SMALL INTESTINE
00311 00509* 00512 00565 00829* 00830* 00888 00890
00904* 00926 00927 00973 00990* 01395* 01397* 01399*
01400* 01402 01414 01666* 01782* 01816 02047* 02053*
02054* 02056* 02291* 02708* 02734* 02889* 03191* 03672*
03798* 03805 04079* 04508* 04515 04522* 04671* 04676*
04680 04786 04927 04971* 05428 05438* 05442* 05452*
05453* 05619 05620 05623* 06307* 06338 06361 06511*
06778 07448* 07454* 07708* 08064* 09941
MUCOSA,STOMACH
00033* 00034* 00035* 00151* 00171 00173 00299 00412
00420 00421 00422 00423 00425 00433* 00484 00487
00511 01010* 01014* 01044 01046 01047 01048 01175*
01299* 01304 01359 01360 01811 01812 01908* 01912*
01918* 01923 02223* 02262* 02273 02703* 02704* 02705*
02707* 02796* 02800* 02808 03004* 03052* 03056* 03073
03218* 03237 03612 03617 03618 03621 03704* 03705*
03711* 03726 03730 03941 03954 04502* 04504* 04507*
04527 04541* 04605* 04778* 04785 04819 04858* 05319
05407* 05409* 05410* 05427 05434* 05436* 05493* 05506*
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06342* 06412* 06421 06525* 06609* 06618* 06624 06642
06672 06686* 07297* 07598 07615* 08107 08476 08499
09008 09077* 09873 09900 09954* 09977* 10208 10247
10278*

MUCOSAL INJURIES,SMALL INTESTINE
00028
MUCOSAL INJURIES,STOMACH
10251
MUCOVISCIDOSIS
00625* 00626* 00628* 02343 02417 02418 02419 02420
05925* 06043 06934 06939 06944 06945 06947 08727*
09600* 09604 09677 10408* 10517 10519 10520
MUCUS
04671* 05768* 09600*
MUCUS SECRETION,STOMACH
00002* 00012* 00013* 00161 00166 00390* 01024* 01031*
01045 03705* 06686* 06698* 08161* 08168* 08178* 08405
08479* 09077* 09830 09979* 09980* 09982* 09992* 10280*
MUD THERAPY
10599
MUSCLE MORPHOLOGY,SMOOTH
03606* 07264* 09902
MUSCLE MOTILITY,SMOOTH
02987 09051
MUSCLE PHARMACOLOGY,SMOOTH
08095 09948* 09950* 09960*
MUSCLE PHYSIOLOGY,SMOOTH
01868* 01870* 02721 02754* 02773 02994* 03036 03609*
03666* 03674* 03675* 03679* 03684 03687 03694 04563*
04564* 04567* 04568* 04569* 04571* 04572* 04573* 04578*
04580* 04581* 04584 04585 04587 04589 04591 05411*
05412* 05414* 05415* 05468* 05469* 05481 07264* 07265*
07475* 09046 09051 09129* 09924* 09948* 09949* 09952*
09964
MUSCLE,SMOOTH
00915
MUSCULOSKELETAL SYSTEM
00613* 00634 00654* 00731* 00922 01575* 07467 08257
08588 09482* 10812*
MYASTHENIA GRAVIS
08725
MYCOSIS
10194
MYELOMA
01685*
MYOBLASTOMA
02369
MYOTONIA DYSTROPHICA
03911*

NAUSEA
01905* 01906*
NECROSIS
01464 03555 06736*
NECROSIS,LARGE INTESTINE
02387 02388 04056 04201 05041 07764 08038
NECROSIS,LIVER
01556* 01557* 01588 02471 02481 02485 03358 03397
03408* 03414 03605* 04305 04326* 04329* 04331* 05142*
05150* 05212* 05216 05225* 05241 05267* 06070* 06125
06157 07905 08763* 08827* 08842 10095 10567*
NECROSIS,PANCREAS
05405* 06033*
NECROSIS,STOMACH
05785
NECROTICANS,ENTEROCOLITIS
03228* 07154* 08525* 08657* 09441
NEONATAL JAUNDICE
00693 01069* 02845* 06968* 06975* 07001 07488* 07844*
07846* 07853 08760* 08780 08781 09204* 09686 09712*
09802* 10623
NEOPLASMS,ABDOMEN
00838 01724 02182 05363 06946 08060
NEOPLASMS,ANUS
04180 05074
NEOPLASMS,BENIGN ABDOMEN
06267
NEOPLASMS,BENIGN BILIARY TRACT
00781
NEOPLASMS,BENIGN DUODENUM
01391 06748 07750
NEOPLASMS,BENIGN ESOPHAGUS
01285 01286 06574 08359 09248 10176
NEOPLASMS,BENIGN GALLBLADDER
04451 05332 07141 08892 10800
NEOPLASMS,BENIGN GASTROINTESTINAL
01728
NEOPLASMS,BENIGN LARGE INTESTINE
00576* 05032 05058 06000 07723* 08708 09528* 10457
10476
NEOPLASMS,BENIGN LIVER
05191 06083 06133 07881 10602
NEOPLASMS,BENIGN MESENTERY
08043
NEOPLASMS,BENIGN PANCREAS
06935 06943 10527
NEOPLASMS,BENIGN RECTUM
06850 06853 07723*
NEOPLASMS,BENIGN SMALL INTESTINE
00521 01389 02302 03117 06751 06787 07662 09446
NEOPLASMS,BENIGN STOMACH
00398 00402 00405 01312 02226 03117 03913 04778*
04837 06632 06640 06643 08414 08459 09315 09324
09373 10215 10216
NEOPLASMS,BILIARY TRACT
00780 00782 02595 02597
NEOPLASMS,DUODENUM
00515 02297 02299 02300 08563
NEOPLASMS,ESOPHAGUS
01288 01289 02198 03890 08376
NEOPLASMS,GALLBLADDER
01628 01629 01629 02589 08904 08925
NEOPLASMS,GASTROINTESTINAL
00689 00843 00844 01731 08948
NEOPLASMS,LARGE INTESTINE
00009* 01381 01430 02129 02362 02372 04145 04178
04191 04202 04511 06908 07729* 07776 08712 08718
09519* 09520* 09548 09577 10870
NEOPLASMS,LIVER
01516 01519 02434* 02448* 06970* 06990 06995 07823*
07849 07878 07986 09657*
NEOPLASMS,MALIGNANT ABDOMEN
01723 09479* 09851*
NEOPLASMS,MALIGNANT ANUS
00585 07732 07735 07743 07759 08697 09533 09534
NEOPLASMS,MALIGNANT BILIARY TRACT
00612* 00762* 00779 00846 01630 02178 07107* 08008
08923 09793* 09800* 09808* 09814 10643 10764* 10796
NEOPLASMS,MALIGNANT DUODENUM
00846 02298 02303 06791 07660 07684 07686 08581
08593 08729 09451 09457 10371
NEOPLASMS,MALIGNANT ESOPHAGUS
00361* 00362* 00363* 00376 01287 01290 02199 02200
02201 07548 07569 08339 08343 08347 08372 08373
08383 09243* 09244 09258 09259 09260 09268 09276
10189 10193
NEOPLASMS,MALIGNANT GALLBLADDER
00332 00612* 00762* 00778 00779 07144 07972* 08001
08006 08890 08914 09800* 10786
NEOPLASMS,MALIGNANT GASTROINTESTINAL
00577 00845 01296* 01721 01722 01726 01727 01729
01730 01733 02218* 02377 06527* 06639 07693 08955
08956 09228 09230 10489 10834
NEOPLASMS,MALIGNANT LARGE INTESTINE
00265* 00567* 00578 00581 00582 00583 00607 01415*
01416* 01423 01424 01425 01426 01427 01429 01431
01432 01433 01434 01435 01436 01439 01440 01678*
02344* 02345* 02346* 02348* 02349* 02350* 02351* 02352*
02360 02361 02369 02370 02371 02373 02374 02375
02376 02378 02379 02389 02398* 06836* 06844 06846
06848 06863 06871 07736 07743 07753 07756 07769
07781 07787* 07834* 08650* 08651* 08658* 08661* 08675
08698 08700 08705 09508* 09516* 09518* 09523* 09528*
09561 09586* 10427* 10438* 10447 10448 10473
NEOPLASMS,MALIGNANT LIVER
00275* 00356 00651* 00652* 00671 00672 00673 00674
00675 00676 00679 01486* 01508 01509 01510 01511
01512 01513 01514 01515 01518 01521 01526 01977*
01992 02007 02146 06971* 06993 07027 07829* 07831*
07832* 07852 07870 07897* 08777 08818 08874 09653*
09672 09675 09691 09754 10555* 10556* 10615 10629
10658
NEOPLASMS,MALIGNANT MESENTERY
08974
NEOPLASMS,MALIGNANT PANCREAS
00265* 00627* 00631 00632 00633 00634 00635 00636
00637 00846 00847 01464 01465 01466 01467 02408*
02411 02412 06927* 06938 07793* 07800 08025 08729
08732 08736 09599* 09609 10508* 10510* 10512* 10523
10529 10530
NEOPLASMS,MALIGNANT RECTUM
00584 00585 00607 02130 02351* 02376 02390 02391
06836* 06844 06846 06889 07733 07735 07743 07753
07759 07775 08697 09508* 09518* 09559 09568 10429*
10437* 10447 10456 10473
NEOPLASMS,MALIGNANT SALIVARY GLAND
00762* 01725
NEOPLASMS,MALIGNANT SMALL INTESTINE
00508* 00511 00516 00518 00519 00543 01383 01384
01385 01386 01387 01388 02292 02293 02295 02296
02301 02325 06764 06767 06771 06772 06787 06810
07653* 07681 07708* 08570 08580 08588 08594 09443
09470 10370 10377
NEOPLASMS,MALIGNANT STOMACH
00293 00363* 00389* 00390* 00391* 00396 00397 00399
00400 00401 00403 00404 00474 01287 01297* 01304
01305 01306 01307 01308 01309 01310 01311 01313
01314 01315 01316 02113 02114 02172 02217* 02218*
02219* 02224 02225 02227 02228 02229 02230 02231
02232 02292 06622 06635 06636 06656 06680* 06687*
07487* 07585* 07593 07594 07599 07604 07606 07632
08025 08388* 08390* 08397 08408 08432 08434 08435
08445 09244 09258 09292* 09298* 09300* 09301* 09306
09311 09314 09325 09339 09340 09344 09350 09372

NEOPLASMS,MALIGNANT STOMACH
CONTINUED
09415 10189 10216 10217 10224 10225 10226 10230
10249
NEOPLASMS,MESENTERY
04053 05929* 10150
NEOPLASMS,PANCREAS
00630* 02415 03309 07803 07804 07806 08730 08731
09605 09611 09633* 10516
NEOPLASMS,RECTUM
01437 01438 02389 06888 07729* 08671
NEOPLASMS,SALIVARY GLAND
00839 00840 04199 04457* 09869
NEOPLASMS,SMALL INTESTINE
00520 01381 01382 01390 02294 02304 04955 06795
07690 08599 08718 09423* 09431* 09462
NEOPLASMS,STOMACH
00406 00407 01220 02233 06652 06653 07596 07603
08424 08436 08439 08443 08444 08473 09299* 09359
09363
NEOPLASMS,VILLOUS GASTROINTESTINAL
08594
NEOPLASMS,VILLOUS LARGE INTESTINE
06838* 07774 08708 09547
NEOPLASMS,VILLOUS RECTUM
07774 08716 09560 10485
NEOPLASMS,VILLOUS SMALL INTESTINE
10375
NERVOUS CONTROL OF ANUS
04104* 05079
NERVOUS CONTROL OF BILIARY TRACT
04572* 04575* 05402* 09014
NERVOUS CONTROL OF ESOPHAGUS
00102 00980* 02767 03012 05729 06589 09965
NERVOUS CONTROL OF GALLBLADDER
00815 01831 02266* 08901
NERVOUS CONTROL OF GASTROINTESTINAL TRACT
00921 00938 01007 01008 01899 02641 05474 07206*
08142* 09038* 09040
NERVOUS CONTROL OF LARGE INTESTINE
02357* 02358* 02386 03795* 04109* 05685 08095 09044
NERVOUS CONTROL OF LIVER
00209 01823 04393* 05277 05402* 09163
NERVOUS CONTROL OF MOTILITY
00101 03668* 03669* 03670* 04579* 05469* 05474 05479
05486* 06367* 07279 09953* 09959*
NERVOUS CONTROL OF PANCREAS
04619* 05097* 05531* 06304*
NERVOUS CONTROL OF SALIVARY GLANDS
08090 09052*
NERVOUS CONTROL OF SMALL INTESTINE
00092* 00094* 00989* 02777 04023* 04574* 05412* 05414*
05602* 05623* 05624* 06371* 06374* 08143* 08146 09004
09019 09044 09960*
NERVOUS CONTROL OF STOMACH
00984* 01877 03140 03669* 03670* 03912* 04609* 04788
04854* 05420 05479 06304* 06385 06387 09039* 09049
NERVOUS CONTROL OF STOMACH SECRETION
00154 01015* 01018* 03702* 04853* 05486* 05493* 05497*
05502* 05828* 06413* 07283* 08161* 08187* 09065* 09075*
09978*
NERVOUS SYSTEM,AUTONOMIC
00001* 00022 00023 00025 00854 01170* 01709 01867*
01903* 01917* 01918* 02445* 02730 03945 08486* 08950
10174 10210
NERVOUS SYSTEM,CENTRAL
SEE ALSO NEUROENDOCRINE CONTROL
00111 00154 00854 00881 00984* 01008 01345* 02032
06367* 07355 07537* 07626* 07809 07811 08092 08178*
08267 08753* 08763* 08998 09040 10124* 10639 10734*
NEURINOMA
07516 10796
NEUROENDOCRINE CONTROL
00090*
NEUROHUMORAL AGENTS
01173* 01174* 09421 10243
NEUROMATOSIS
06833*
NEUROMUSCULAR DISEASES
00105
NITROGEN ABSORPTION
06262*
NOREPINEPHRINE
02755* 10079 10124*
NUCLEIC ACID METABOLISM
04555 06290* 06497 07448* 07458 09176 09713*
NUCLEIC ACID METABOLISM,LIVER
00208 01085* 01093* 01113 02435* 02569 02842* 02854*
02855* 02861* 02865 02885 02909* 03745* 03768 04297
04300 04643* 04656 05163 05460 05549* 05571 05573
05581 06097 06156 06441* 06468 06482 06504 07347*
07382 07388 07411 07441 07443 08217* 08222* 08263
08281 09132* 09140 10016* 10017* 10023* 10615 10750
NUCLEIC ACID SYNTHESIS,LIVER
00212 01094 01149 01150 01151 03768 06462* 07316*
07335* 07379 08253
NUCLEIC ACIDS,LIVER
01095 01096 02043 06322 06460* 07402 07410
NUTRITION
SEE ALSO KWASHIORKOR
SEE ALSO MALABSORPTION
SEE ALSO OBESITY
SEE ALSO VITAMINS
02471 04084 04086 04095 04469 04935 05072 05198
05369 05429 05454* 05578 05615 05938 06330 07460
08406 08941* 10730*

OBESITY
01476 02886 03156 04066 04919* 05150* 06076* 06742*
06743* 07209* 07651* 07680 08216* 08393* 08538 09082
10050* 10086 10808*
OBSTRUCTION,BILIARY TRACT
00331 00765* 00771* 00780 00795 01247 01624* 02446*
02583 03345* 03346* 03380 03489* 03490* 03493* 03510
03519 03527 03539 03598 03756* 04407* 04421* 04429
04448 05271* 05288* 05306 05324 06208* 06213* 06224
06232 06237 06239 06248 06250 07106* 07124 07147
07148* 07830* 08924 09811 09814 10067* 10516 10576*
10772*
OBSTRUCTION,DUODENUM
00526 01376 02299 02318 05862* 08392* 08523* 08894
OBSTRUCTION,ESOPHAGUS
02994* 04734 05726 05757 06586
OBSTRUCTION,GASTROINTESTINAL
00387 00533 00834 00836 00852 01224 02104* 02625
02972 04456* 06263*
OBSTRUCTION,LARGE INTESTINE
00503* 01228 01432 01440 01447 02287* 03180 03205*
03207* 03226* 04133 04200 04913* 05027 05037 05059
05061 05069 05081 05894 05983 06542 06544 06872
06882 06905 07191 07665 07764 07795* 08650* 08683
08692 09427* 09436 09519* 09537 09575 09943* 09956*
10340* 10341* 10472
OBSTRUCTION,PANCREAS
07148*
OBSTRUCTION,PYLORUS
01010* 02195 03050* 03159 08623* 10197*
OBSTRUCTION,SMALL INTESTINE
00095* 00310 00503* 00510* 00518 00524 00528 01369*
01370* 01866* 02104* 02168 02285* 02286* 02287* 02308
02974 03164 03180 04015* 04017* 04020* 04026 04027
04030 04035 04038 04051 04054 04055 04059* 04060
04065 04912* 04913* 04916* 04918* 04930 04939 04942
04947 04948 04954 04956 04961 04962 05380 05680
05681 05766* 05862* 05865* 05874 05878 05879 05891
05900 05901 05902 05906 05919 06542 06544 06752
06759 06776 06793 07191 07648* 07653* 07665 07671
07673 07795* 08424 08529* 08539 08540 08541 08543
08547 08592 08595 08600 08610 08612 08627 09425*
09430* 09436 09439 09448 09466 09888 09943* 10340*
10341* 10355 10361 10363 10368 10378 10382 10385
OBSTRUCTION,STOMACH
04007 04790 04798 04835 05786 05788 07587*
OBSTRUCTIVE JAUNDICE
00325 00335 00524 00707* 00768* 01262 01535 01614
01624* 01625* 01639 01641 01798 02303 02583 02599
02851* 03351* 03489* 04263* 04317 04419* 04448 04456*
04604* 05101 05271* 05315 05651* 06061* 06069* 06123
06233 06964* 06977 07050* 07827* 07979* 07984* 08303
08905 09793* 09821 10614 10777
OBSTRUCTIVE,JAUNDICE
02441*
ODDI,SPHINCTER OF
SEE ALSO BILIARY TRACT
00107 00534 00770* 00814 01257 01258 03527 04445
04575* 05328 05471* 06246 06379* 07110* 08886* 09127*
09796* 09799* 09812 09823 10338* 10761* 10784
OMENTUM
01451 05713
OMENTUM,GREATER
01696 07688
OMPHALOCELES
08401 08958
ORAL MUCOSA
10389*
OXYGEN
00051* 00222 00235 00695* 01159* 06178 06330 09026*
09118* 09178 10063*

PAIN,ABDOMEN
00491 00796 00797 00870 01351* 01500 01691 02604*
02617* 03227* 03535 04422* 04459* 05336* 05351 05374
08326 08902 08950 08951 09245 09875
PANCREAS
06946
PANCREAS ABSORPTION
03648*

PANCREAS AMYLASE SECRETION
00268* 00639* 01050* 01938* 02817* 02820* 04615* 04617*
04689* 04690* 05119* 05123* 05526* 08203* 09999* 10009*
PANCREAS ANGIOGRAPHY
02918* 02954 04250 04254 05135 05645* 05690 06045
06048 06930 06931 08735 09195 09602 09607 09613
10524 10525
PANCREAS ANOMALIES
02307 02416 03074 03307 03317 04221 04223 04226
04949 05110 05786 06038 06041 06047 06926* 06940
09356 10514 10515
PANCREAS BICARBONATE SECRETION
00182 01910* 01911* 01935* 01941* 01942* 02134 07303*
08197* 08198* 08201* 09089* 09092* 09213* 10007*
PANCREAS BIOCHEMISTRY
01064 01932* 02621* 05450* 07306* 08199* 08204* 10001*
PANCREAS CALCULI
03310 06941 07138 07805 09619* 10508*
PANCREAS CANCER
02617* 03305* 03312 03314 03316 03850 04219* 04225
04227 04228 04232 04233 04477 04689* 04697* 05097*
05098* 05101 05103 05114 05116 05124 05339* 05342
05343 05645* 06037 06040 06045 06049 06259* 06528*
06535* 06933 07798 08728* 09197* 09606 09630
PANCREAS CHEMICAL COMPOSITION
07302*
PANCREAS CIRCULATION
00252 02908* 02918* 03313 04310 05117 05127 05133
06048 06427* 07035 09002* 09195 10010* 10511*
PANCREAS CYSTS
02137 03089 03306 03311 03315 03317 03318 04220*
04224 04227 05111 05112 05118 06032* 06039 06046
06047 06048 06937 08034 10512* 10528 10534*
PANCREAS DEVELOPMENT
03738 04617* 07302* 08085* 08106 10002*
PANCREAS DIAGNOSIS
00265* 00266* 00268* 00269* 00295 00352 01232 01463
02134 02135 02136 02418 02913* 02954 02981 03319
03843 04220* 04228 04230 04627* 04689* 04690* 04697*
04700* 04701* 05109 05118 05121* 05123* 05135 05645*
05646* 05658* 05690 05691 05692 05693 05694 05695
05707 06032* 06035* 06036* 06042 06045 06046 06052*
06566 06927* 07307* 07308* 07806 08294* 08305 09197*
09210* 09213* 09620* 09630 10134* 10137* 10512* 10518
10521 10534*
PANCREAS DISEASE EPIDEMIOLOGY
10513*
PANCREAS DISEASE ETIOLOGY
00640* 10513*
PANCREAS DISEASE TREATMENT
01463 03733*
PANCREAS DISEASES
00638 00736 00881 02409* 03308 03313 03319 03320
03570 03587 03588 03594 04222 04291 04689* 05095*
05099* 05102 05113 05115 05116 05276 05341* 05958*
06033* 06036* 06042 06044 07079 07794* 07795* 08016*
08737 08936* 08960 08994 09502 09607 09610 09613
09622 10149 10508* 10526 10547
PANCREAS DISEASES,BIOCHEMICAL DIAGNOSIS OF
10518
PANCREAS DUCTS
00063* 00821 02715* 08733 10522
PANCREAS ELECTROLYTE SECRETION
00628* 01941* 01942* 08205*
PANCREAS ENZYME SECRETION
00176* 00177* 00178* 00185 01053* 01057* 01063 01933*
01936* 01937* 01939* 01943 02816* 02817* 02822* 08198*
08202* 08204* 08207 09092* 09620* 10008* 10012* 10013*
10014* 10339*
PANCREAS ENZYMES
SEE ALSO PANCREAS DISEASE DIAGNOSIS
00267* 00353 00646 00828* 01049* 01056* 01468* 01469*
01472 01473 01932* 01940* 01943 01944 01948 02328*
02615* 02716* 02815* 02819* 02820* 03304* 03323* 03324*
03733* 03734* 03736* 03737* 03738 04235* 04242* 04242*
04617* 04618* 04620* 04621* 04625* 04626* 04627* 05131
05525* 05526* 05527* 05528* 05532* 05537 06044 06417*
06423* 07301* 07302* 07305* 08199* 08888* 09055* 09087*
09100 09234 09601 09713* 10000* 10006*
PANCREAS FISTULAS
00190 05102 08731
PANCREAS HISTOLOGY
00177* 00629* 00906* 02421* 03331 08105 08109 08210
08259 09097 09100 10005*
PANCREAS IMMUNOLOGY
02716* 06927*
PANCREAS IN CHILDREN
00625* 00626* 00628* 00635 00636 00648 02417 02418
02420 03316 04223 04477 05112 06041 08785 10154
PANCREAS INJURIES
04231 05100 05104 05105 05370 06034* 07233 08023
10123* 10522
PANCREAS LIPASE SECRETION
00179* 00188 02815* 03734* 03736* 03737* 04616* 05527*
05537 08203* 09089* 09618* 09999*
PANCREAS METABOLISM
01059* 01065 01820 02821* 02824 02825 02826 02829
02909* 03326* 03648* 03735* 03736* 04238* 04239* 04240*
04240* 04241* 04241* 04616* 04618* 04626* 04629* 04630*
04632* 05524* 05535 05536 05596 08209 09086* 09091*
09095 09999* 10002* 10004* 10008* 10013* 10014* 10015*
PANCREAS MORPHOLOGY
00638 00907* 01058* 01673* 01820 02621* 02715* 02716*
02720 02731 02816* 02824 02910* 05097* 05422 06317
07233 07305* 07801
PANCREAS NECROSIS
05405* 06033*
PANCREAS NEOPLASMS
00630* 02415 03309 07803 07804 07806 08730 08731
09605 09611 09633* 10516
PANCREAS NEOPLASMS,BENIGN
06935 06943 10527
PANCREAS NEOPLASMS,MALIGNANT
00265* 00627* 00631 00632 00633 00634 00635 00636
00637 00846 00847 01464 01465 01466 01467 02408*
02411 02412 06927* 06938 07793* 07800 08025 08729
08732 08736 09599* 09609 10508* 10510* 10512* 10523
10529 10530
PANCREAS OBSTRUCTION
07148*
PANCREAS PATHOLOGY
00643* 02408* 08733 08734 10012* 10537*
PANCREAS PERFUSION
05525* 08210 10011*
PANCREAS PHOSPHOLIPASE SECRETION
01932* 04620*
PANCREAS PROTEIN SECRETION
00628* 02829 08200* 10007*
PANCREAS PSEUDOCYSTS
02413 02414 07802 08740* 09608 09612 10508* 10509*
PANCREAS RADIOLOGY
SEE ALSO PANCREAS DISEASE DIAGNOSIS
02981 03315 03320 03845 04697* 05691 05693 05694
05695 06037 06528* 08295* 08321 08737 08738 09224
10154 10525
PANCREAS REGENERATION
01820 01821 02816* 04629* 04630* 06429
PANCREAS RUPTURE
07799 07818
PANCREAS SECRETION
00011* 00085 00174* 00175* 00180 00181 00183 00186
00189 00907* 00962 01049* 01052* 01054* 01055* 01056*
01059* 01060 01061 01934* 01945 01946 01947 01948
01949 02620* 02657 02658 02716* 02818* 02823* 02826
02827 02828 02831 02832 02833 03304* 03648* 03710*
03731* 03732* 03734* 03735* 03737* 04248 04615* 04617*
04619* 04621* 04622* 04623* 04624* 04625* 04627* 04628*
04631* 05095* 05121* 05226* 05450* 05485 05505* 05529*
05530* 05531* 05532* 05533* 06035* 06259* 06426* 06427*
06428 06431 06745* 07286* 07473* 07794* 07796 08197*
08201* 08206 08208 08750 09085* 09088* 09096 09098
09099 09100 09896* 10010* 10011*
PANCREAS SURGERY
00627* 00630* 01471* 01482 02408* 02410* 02412 03739
04042 04219* 04231 04234 04237* 04251 05096* 05098*
05100 05103 05106 05107 05610* 06052* 06057 06935
06937 06941 07801 07805 08033 09611 10512* 10649
PANCREAS TRANSPLANTATION
04234 05096* 06925* 06928* 06929* 06942 10511*
PANCREAS TRAUMA
00644* 00645 02410* 03321 04229 04230 04466 05096*
05104 05105 06936 07817
PANCREAS TREATMENT
03311 04224 04230 05100 05108 05122* 05131 06046
07802
PANCREAS TRYPSIN INHIBITION
05534* 09090*
PANCREAS TRYPSIN SECRETION
01051* 01062 02817* 05534* 07308*
PANCREAS ULTRASTRUCTURE
00011* 00906* 00907* 01821 02817* 02821* 03316 03321
03334 03648* 04238* 04629* 04630* 04632* 05120* 05405*
05422 05525* 06050* 07208* 07230 08207 09603 10005*
10011* 10012*
PANCREAS,AGE EFFECTS ON
02825 03315 04617* 06317 06428 08208 10000*
PANCREAS,ALCOHOL EFFECTS ON
00644* 01057* 01058* 04239* 04240* 07040* 10513*
PANCREAS,CLINICAL STUDIES OF
00643*
PANCREAS,DISEASES ASSOCIATED WITH
00638 01465 02408* 02417 02418 02419 02420 06043
PANCREAS,DRUG EFFECTS ON
00174* 00175* 00180 01059* 01935* 01938* 01939* 01947
02422* 02816* 02818* 02827 02828 02830 02908* 02918*
03308 04615* 04619* 04629* 04630* 05505* 05524* 05530*
05531* 06034* 06035* 06036* 06426* 06932 07208* 08200*
09091* 10004* 10005* 10008* 10013*

PANCREAS,DRUG TREATMENT OF
00649 01466 04255 05122* 06054
PANCREAS,HORMONAL CONTROL OF
00011* 00176* 00181 00183 00184 00185 00628* 01053*
01054* 01061 01064 01065 01934* 01937* 01938* 01939*
01941* 01945 01946 01948 03735* 03739 04625* 04631*
05533* 06426* 06508* 07286* 07303* 08202* 09092* 09093
09097 09099 10100*
PANCREAS,NERVOUS CONTROL OF
04619* 05097* 05531* 06304*
PANCREAS,TOXIC EFFECTS ON
04238* 04241* 06034* 06049 10005* 10006*
PANCREATECTOMY
01050* 05107 05552* 05610* 06374* 07821* 09601 09621*
10510* 10532* 10544
PANCREATIC DISEASES,BLOOD COAGULATION IN
09616*
PANCREATITIS
00645 01057* 01481 02408* 02615* 02617* 02618* 03147*
03324* 03557 04244 04246 04250 04690* 05102 05116
05121* 05129 05132 05134 06938 07811 07816 08743*
08744 09827 10338* 10545 10549 10550 10716* 10766*
PANCREATITIS COMPLICATIONS
03325* 03336 04253 05137 06032* 06051* 06055 07808*
PANCREATITIS DIAGNOSIS
00267* 01198* 01471* 01478 01480 03322* 03324* 03325*
03327* 04690* 04697* 04700* 04701* 05119* 05646* 05658*
06056 06528* 06948* 06952* 06953* 06954 06955 07033
07036 07499 08735 08745 09197* 09624 10003* 10009*
10533* 10535* 10536* 10546 10776
PANCREATITIS EPIDEMIOLOGY
03326*
PANCREATITIS ETIOLOGY
01470* 01476 01478 03323* 04239* 04240* 04256 05120*
05128 05134 06055 07815 08747 09614* 10531* 10535*
10538*
PANCREATITIS ETIOLOGY,ACUTE
06950* 06952*
PANCREATITIS IN CHILDREN
01471* 03322* 04245
PANCREATITIS PATHOLOGY
05123* 05133 05136 05314 06050* 06055
PANCREATITIS PROPHYLAXIS
06054 08739*
PANCREATITIS SURGERY
03329 03330 03333 04237* 06057 06948* 06949* 07813
08751 09619* 09621* 10532* 10538* 10544
PANCREATITIS TREATMENT
01477 01478 03325* 03335 04255 06052* 07036 07815
08739* 08745 08746 08748 08749 09617* 10535* 10540
10548
PANCREATITIS,ACUTE
00643* 00644* 00646 00649 01472 01473 01474 01475
01476 01477 01479 01482 02424 03323* 03325* 03332
03334 03337 04239* 04241* 04242* 04243 04245 04249
04252 04253 04256 04700* 04701* 05120* 05126 05130
05131 05133 06050* 06056 06057 06058 06059 06949*
06951* 06952* 06953* 07035 07812 07813 07818 07819
08742* 08748 08749 09616* 09617* 09620* 09621* 09623
09624 09625 10531* 10532* 10533* 10539 10547 10548
PANCREATITIS,ALCOHOLIC
03328 10535* 10538*
PANCREATITIS,CHRONIC
00630* 00647 00648 00650 02421* 02423 03327* 03329
03330 03331 03333 04237* 04247 04248 04251 04254
04624* 04690* 04701* 05097* 05119* 05123* 05124 05125
05127 05135 05136 05646* 06035* 06051* 06053 06948*
06954 06955 07033 07034 07303* 07808* 07810 07815
08749 08750 08751 09615* 09619* 09626 09628 09629
09630 10508* 10541 10542
PANCREATITIS,CIRCULATION IN
09628 10543
PANCREATITIS,DISEASES ASSOCIATED WITH
00640* 00650 00804 01474 01476 02395 02416 06951*
07809 07810 07814 07817 09837 10541 10543
PANCREATITIS,DRUG-INDUCED
01468* 10537*
PANCREATITIS,EXPERIMENTAL
00178* 00639* 00641* 00642* 00646 01468* 01469* 03334
04235* 04236* 04241* 04242* 04252 05122* 05126 06034*
06036* 06050* 06054 06430 07807* 08740* 08741* 09627
10540
PANCREATITIS,HEMORRHAGIC
00640* 00642* 01475 02422* 04244 04700* 06949* 08741*
08746 09621* 10531* 10532* 10535* 10538*
PANCREATITIS,METABOLIC CHANGES IN
06953* 07807* 09618* 10537* 10542 10551
PANCREOZYMIN
00175* 01053* 01065 01945 01946 01948 03735* 04621*
04622* 04623* 04625* 04626* 04628* 05095* 05121* 06508*
07095 09066* 09073* 09089* 09618*
PANETH CELLS
06829
PARACENTESIS,ABDOMEN
SEE ALSO ABDOMEN DIAGNOSIS
03464* 07480* 07724* 07728*
PARASITES AND PARASITIC DISEASES
SEE ALSO AMEBIASIS
SEE ALSO SCHISTOSOMIASIS
04497* 05144* 07014 07024 07128 07198* 07202 07872
08072 08630 08769 08986* 08988* 08993 08994 08995
08997 09272 09699 09882 09883 09888 09891 10353
10860* 10865
PARASITES,DRUG TREATMENT OF
03597* 04499
PARASITIC DISEASE DIAGNOSIS
00358 01269 01270 01782* 01800 02184 02185 04500
04719 06294 07199 08985* 08992 10572*
PARASITIC DISEASE EPIDEMIOLOGY
06089 06293 07202 08993 09889 10572* 10857*
PARASITIC DISEASE ETIOLOGY
00893 01794
PARASITIC DISEASE PATHOLOGY
00892 00897 01789 01790 01798 01800 02688 02689
02695 02696 02698 03596* 03598 03600 04301 04448
04498 04957 05394* 05395 05396 05397 05398 05399
06095 06139 06289* 06290* 06291 06292 06293 06294
06295 06296 06297 06298 06299 08064* 08071 10859*
PARASITIC DISEASE TREATMENT
00891* 01785 01787 01788 02693 03597* 04284 04299
04499 05159* 05397 05400 06495 06641 07200 07201
08992 10572* 10857*
PARASITIC DISEASE-INDUCED SECONDARY MALABSORPTION
08064* 08999 10198* 10858*
PARASITIC DISEASES
SEE ALSO PARASITES AND PARASITIC DISEASES
00896 00899 01783* 01791 01792 01795 01796 01797
01799 02687* 02690 02691 02692 02694 02695 02697
02699 02700 03599 04497* 04957 06232 06248 06287
07201 09766 09811 10522 10528 10595 10607 10638
10862 10863 10869
PARASITIC DISEASES IN CHILDREN
01784* 01787 06095 06296 07203 08067 08989 08990*
08992 08998
PARASITIC DISEASES,DISEASES ASSOCIATED WITH
00555 01796 08070 09398 10857*
PARASITIC DISEASES,PARASITES AND
SEE ALSO AMEBIASIS
SEE ALSO SCHISTOSOMIASIS
04497* 05144* 07014 07024 07128 07198* 07202 07872
08072 08630 08769 08986* 08988* 08993 08994 08995
08997 09272 09699 09882 09883 09888 09891 10353
10860* 10865
PARATHYROID GLANDS
05448* 07583* 09614* 09847* 09861 10117* 10531* 10809*
PARATYPHOID FEVER
SEE SALMONELLOSIS
PARIETAL-CELL ANTIBODY,GASTRIC
06609* 08390* 10200* 10220
PATHOPHYSIOLOGY,MALABSORPTION
05924* 07184 08616* 08639 09490 10406*
PAVLOV POUCH STUDIES
07291* 08164* 09188*
PELLAGRA
06815* 10849
PENTAGASTRIN
00103 00131* 00132* 00133* 00135* 00165 00294 00300
00486 01027* 01029* 01210 01910* 01911* 01913* 01917*
01920* 01930 01949 01950* 02097* 02249* 02789* 02790*
02813 02819* 03712* 03762* 04597* 05406* 05502* 06404*
06405* 06406* 06408* 07089* 08020* 08116* 08138* 08170*
08190 08191 08192 08198* 08230* 08484* 09060* 09064*
09078* 09171* 09380* 09383* 09967* 09968* 09975* 09981*
09983* 09986* 09988* 09989* 09994* 10271* 10404*
PEPSIN
00017* 01012* 02793* 02794* 05490* 05491* 05514 06411*
06412* 07294* 07478* 08188 09985* 09995*
PEPSIN SECRETION,STOMACH
00148* 00149* 00150* 00166 00486 01009* 01030* 01905*
01906* 03712* 03713* 05499* 07288* 07293* 08167* 09062*
09063* 09067* 09070* 09377* 09970* 09971* 09976* 09986*
09994* 10314 10404*
PEPSINOGEN
00017* 03711* 04779* 05407* 07288* 07294* 07295* 08289*
09209* 09985*
PEPTIC ULCER COMPLICATIONS
01340* 02250* 03146 03989 03993 03997 04004 04849*
04866 04868 04882 04889 04892 04893 05823* 05827*
05836 05840 05853 08338 08403 08491 09384
PEPTIC ULCER DIAGNOSIS
00304 02097* 02118 02120 02121 02920* 03985 03987
04010 04874 04878 04880 04904 04906 07511 10324
10330*
PEPTIC ULCER DIAGNOSIS,RADIOLOGY IN
07630 08516
PEPTIC ULCER EPIDEMIOLOGY
00451* 00454* 00457* 00458* 00459* 00461* 03992 04848*
04884 05151* 05821* 07617* 07634 09406 10317

PEPTIC ULCER ETIOLOGY
00454* 00460* 00465 00478 01342* 01360 01364 02249*
02254* 02255* 02270 02271 02272 02273 02280 02320*
02622 02792* 02794* 02931* 03130* 03704* 03710* 03982
03987 04267* 04844* 04848* 04850* 04853* 04858* 04888
04891 04907 05768* 05831* 05833* 05857 05860 07617*
08480* 10305 10313
PEPTIC ULCER IMMUNOLOGY
04867
PEPTIC ULCER PATHOLOGY
02269 03995 04862* 05802 05848 05852 05855 05893
07615* 08498
PEPTIC ULCER PERFORATION
00458* 00468 01351* 02277 02281 03978 04008 04890
04893 05821* 05834 05840 05851 05859 08492 08494
08508 09393 10311 10322
PEPTIC ULCER PROPHYLAXIS
05832* 05850 09072* 09379* 10271* 10307
PEPTIC ULCER SURGERY
00260* 00446* 00447* 00453* 00465 00469 00470 00471
00473 00474 00476 00477 01335* 01336* 01356 01358
01359 02259* 02260* 02261* 02262* 02263* 02264* 02265*
02266* 02275 02276 02277 03061* 03128* 03135 03142
03145 03970* 03971* 03972* 03979 03981 03983 03990
03996 03998 04000 04001 04003 04019* 04117* 04608*
04844* 04846* 04847* 04854* 04857* 04859* 04860* 04865
04869 04870 04872 04873 04875 04877 04881 04883
04886 04887 04890 04892 04895 04897 04900 04901
04903 04905 04909 04910 04911 04973* 05299 05636*
05821* 05822* 05823* 05824* 05830* 05835 05838 05843
05844 05846 05847 05852 06691* 06708 06713 06716
06724 06726 07617* 07626* 07636 07641 08490 08492
08495 08507 08512 08513 09389 09390 09391 09397
09399 09403 09404 09411 10272* 10294 10300 10301
10303 10304 10308 10321 10323 10329 10330*
PEPTIC ULCER TREATMENT
00472 00478 01336* 02274 03119* 03124* 03126* 03128*
03133* 03136 03137 03140 03141 03143 03701* 03973*
03974* 03977 03980 03988 03991 03994 03999 04006
04008 04009 04013 04845* 04851* 04852* 04861* 04863
04871 04875 04876 04877 04879 04894 04896 04898
04899 04900 04902 05510* 05818* 05819* 05825* 05839
05845 05846 05850 05851 06733 08403 08494 08501
08502 08508 09377* 10297 10302 10305 10322 10323
PEPTIC ULCERS
00259* 00304 00439* 00440* 00441* 00462 00463 00465
00466 00477 00480 00483 00490 00500 01273* 01348*
01363 01365 03082 03120* 03121* 03123* 03127* 03130*
03131* 03134 03139 03142 03144 03146 03546* 03587
03588 03594 03976 03984 03986 04002 04005 04007
04011 04012 04399 04489 04492 04624* 04779* 04849*
04855* 04856* 04863 04885 04887 05341* 05342 05343
05841 05854 05856 05858 06623 06683* 06691* 06692*
06693* 06697* 06702 06707 06712 06717 06723 07631
07638 08467 08483* 08486* 08487* 08489 08497 08504
08505 09296* 09298* 09380* 09383* 09396 09405 09407
09852 09925* 10286 10302 10312 10315
PEPTIC ULCERS IN CHILDREN
02281 03138 04848* 04908 05850 09390
PEPTIC ULCERS,AGE FACTORS IN
00464 04884 08490 09386 10295
PEPTIC ULCERS,BLEEDING
00395* 00424 00433* 00470 00497 00498 01328* 01336*
04014 04868 04882 04895 05773* 05820* 05849 06730
06732 07581* 07645 08514 08934* 09386 09392 09417
10281* 10295 10306
PEPTIC ULCERS,CIRCULATION IN
09409
PEPTIC ULCERS,CLINICAL STUDIES OF
08498
PEPTIC ULCERS,DISEASES ASSOCIATED WITH
00144* 00391* 00459* 00479 00847 01351* 02253* 02320*
02321* 05802 06627 07511 07621* 08505 10228 10298
PEPTIC ULCERS,DRUG TREATMENT OF
00438* 00467 00489 00493 00494 00495 00496 01329*
01330* 01331* 01345* 01353 01354 01355 03126* 03129*
03137 03967* 03973* 03974* 03999 04769* 04845* 04851*
04861* 04876 04877 04879 05820* 05825* 05845 06686*
06706 07619* 07642 09427* 10292 10313 10314
PEPTIC ULCERS,FREEZING TREATMENT OF
06730
PEPTIC ULCERS,METABOLIC CHANGES IN
09410 10290
PERISTALSIS
01866* 02753* 03818* 04561* 04580* 04747 05412* 05473
05476 08140* 08425 09038* 09040 09945* 09946*
PERITONEOSCOPY
06559 07819
PERITONEUM
00067* 00639* 00794 05366 05380
PERITONEUM DIAGNOSIS
00350 01800 02924 05714 07533 08969
PERITONEUM DISEASES
09882
PERITONEUM ENDOSCOPY
00350 08074 09350 09360 09785 10153 10232 10563*
PERITONEUM RADIOLOGY
SEE ALSO PERITONEUM DIAGNOSIS
07516
PERITONEUM ULTRASTRUCTURE
08096
PERITONITIS
00509* 00589 00834 00835 00837 02314 02473 03509
03568 03569 03574 03577 03580 04486 05075 05269*
05301 05308 07093* 08011* 08096 08963 08987* 09709*
09867 10332* 10352 10355 10363 10391* 10653 10816*
10829 10856*
PERITONITIS DIAGNOSIS
05689
PERITONITIS ETIOLOGY
03579
PERITONITIS IN CHILDREN
05689 10384
PERITONITIS TREATMENT
04034 06283 08011* 08540
PERITONITIS,BILE
04439 08920 09813 10775
PERITONITIS,EXPERIMENTAL
08013*
PERNICIOUS ANEMIA
00014* 01651* 01653* 01781 02095* 02222* 02791* 03046*
03700* 03709* 04777* 06524* 07584* 07586* 08390* 08411
08452 09209* 10809*
PEUTZ-JEGHERS SYNDROME
00538 02680 03177 03178 03257 03267 04052 04931
06740* 06744* 06792 07657 07693 08524* 08535 09447
09454 10358 10359 10364 10365
PHAGOCYTOSIS
07163
PHOSPHATASE,ACID
08269
PHOSPHATASE,ALKALINE
06540* 07477* 07492* 07530 08286* 09894* 10110 10122*
10217
PHOSPHOLIPASE SECRETION,PANCREAS
01932* 04620*
PHOSPHOLIPID METABOLISM
00177* 07420 10014* 10551
PHOSPHOLIPID METABOLISM,LIVER
01997 02425* 05217 06334 06472 08226* 08234* 08251*
09137* 09147 09149 09651* 10020* 10045* 10092
PHOSPHOLIPIDS
00314 09652* 09764 10035* 10560*
PHOSPHORUS
07583*
PHOSPHORUS ABSORPTION
09021*
PHYSICAL ACTIVITY
00169 00220 00227 01191 02039 07012 08172* 09421
09914* 10085 10680* 10746
PIGMENTATION
00655* 00657* 00760* 01197* 01552
PINOCYTOSIS
07207* 09929*
PITUITARY GLAND
03741* 04856* 09637* 10809*
PLASMA ENZYMES
02087* 07824* 08727* 08953
PLASMA LIPIDS
00314 09114* 09710* 10051*
PLASMA PROTEINS
02087* 02746* 03826* 04781* 07250*
PLATELETS
06460*
PLEXUS,CELIAC
02617*
PNEUMATOSIS CYSTOIDES INTESTINALIS
00593 02316 06758 07782
POLYPOSIS
01720 05030 05033 05054 05066 06859 08449 08528*
09316 09322 09454 09510* 10457
POLYPOSIS,RECTOCOLONIC
06836* 07737 08685 08714 09552
POLYPS
SEE PEUTZ-JEGHERS SYNDROME
POLYPS,BILIARY TRACT
09799*
POLYPS,DUODENUM
01390
POLYPS,ESOPHAGUS
01280
POLYPS,GALLBLADDER
01628
POLYPS,GASTROINTESTINAL
03177 03178 05886 10847
POLYPS,LARGE INTESTINE
00574* 00575* 00576* 00607 02356* 03206* 03214* 03215*
03216* 03223* 03257 03266 03267 04119* 04173 04217
05008* 05008* 05009* 05014* 05015* 05017* 05030 05031
05033 05054 05066 05953* 05987 06000 06897 06908

POLYPS,LARGE INTESTINE
CONTINUED
07749 07760 08691 09292* 09513* 09535 09556 10429*
10457 10459
POLYPS,RECTUM
00607 03206* 03221* 03223* 03233 04150 05008* 05014*
05015* 05039 09515* 10429* 10456 10485
POLYPS,SMALL INTESTINE
04052 04173 04931 05886 08528* 08531* 08561 09535
10366
POLYPS,STOMACH
02238 03076 03083 03098 03905* 04173 04778* 04784
04840 05790 05799 08438 08449 08451 09303* 10253
10254 10281*
PORPHYRIA
00651* 01490* 01491* 01492* 01493* 01550 02107* 03354*
03355* 03402 03462* 04275* 04339 06966* 07030 07322*
07340* 07481* 07836* 07869 08771 09635* 09684
PORPHYRIN
05138*
PORTACAVAL SHUNT
00748 00749 01607* 01609* 01919* 02082* 02083* 02444*
02559* 02915* 03367 03368 03370 03453* 03454* 03455*
03470 03471 03472 04265* 04292* 04396 04402 04652*
05151* 05166 05274 05554* 06062* 06072* 06124 06187*
06196 06203 06597 07526 07847* 07966 07967 08754*
09123* 09187* 09275 09644* 09789 10021* 10161* 10590*
10604 10611 10637 10667 10670 10725* 10728* 10735*
PORTAL CIRCULATION
00207* 00243 00246 00247 00248 00326 00359 00855
01172* 01173* 01608* 02084* 02864* 05152* 05622* 06075*
06203 06453* 06518* 06529* 07022 07244* 07839* 07868
07904 08087* 08100 08762* 08764* 08797 08970 09124*
09909 10502* 10552* 10600
PORTAL HYPERTENSION
00660* 00677 00741* 00759 00812 01589 01646* 01647*
01649* 02431* 02450* 02665 02666 03337 03455* 03467
03468 03471 03472 03477 03479 03480 03483 03486
04260* 04269* 04388* 04393* 04394* 04395* 04400 05148*
05271* 05275 05283 05324 05327 06089 06965* 07953*
08797 08822 08864* 08866* 08999 09791 10075* 10543
10552* 10564* 10581* 10592 10594 10630 10673* 10743
10822 10863
PORTAL HYPERTENSION DIAGNOSIS
00272* 00326 00738* 06978 07479* 07839* 09201* 09240*
09615*
PORTAL HYPERTENSION ETIOLOGY
04258* 06133 08762*
PORTAL HYPERTENSION IN CHILDREN
04286 06105 06109 06117 06126 07010 10169 10554*
10632 10640
PORTAL HYPERTENSION PATHOLOGY
06075* 06198 10657
PORTAL HYPERTENSION SURGERY
01488* 06109 06126 06190* 06196 06201 06203 06204
06205 07010 07808* 07828* 07875 07953* 08754* 08759*
08796 08807 09123* 09615* 09644* 09781* 09789 10553*
10562* 10570* 10580* 10616 10624 10668 10726* 10755
10772*
PORTAL HYPERTENSION TREATMENT
02558* 03469 04257* 04258* 05270* 05273* 05274 05281
05285 05286 06062* 06198
PORTAL HYPERTENSION,CIRCULATION IN
02450*
PORTAL HYPERTENSION,DISEASES ASSOCIATED WITH
01487* 02190* 02203 02204 06075* 06105 06965*
POSTNECROTIC CIRRHOSIS
08873
POTASSIUM
01931 05526* 08115* 08225* 10421 10426*
POTASSIUM ABSORPTION
08126*
POTASSIUM METABOLISM
07150* 10024* 10158*
POUCH STUDIES,HEIDENHAIN
07271* 07287* 07291* 08164*
POUCH STUDIES,PAVLOV
07291* 08164* 09188*
PREGNANCY
00084 00113 00640* 00659* 00909* 00952* 01086* 01503
01548 01565 01655* 01851 02401* 02583 03049* 03163
03830* 04005 04056 04304 04419* 04432 04466 04596*
04962 05026 05188 05661 05901 06074* 06125 06451*
06516* 06732 06840* 06858 06952* 07098 07113* 07880
08394* 08599 08703 09381* 09388 09623 09706 10045*
10097 10098 10121* 10315 10423 10471 10614 10647
10668 10856*
PREGNANCY,HEPATITIS IN
02549 07098 07919*
PRESSURE STUDIES,MOTILITY
SEE ALSO ANUS MOTILITY
SEE ALSO BILIARY TRACT MOTILITY
SEE ALSO ESOPHAGUS MOTILITY
SEE ALSO GALLBLADDER MOTILITY

PRESSURE STUDIES,MOTILITY
CONTINUED
SEE ALSO GASTROINTESTINAL MOTILITY
SEE ALSO LARGE INTESTINE MOTILITY
SEE ALSO SMALL INTESTINE MOTILITY
SEE ALSO STOMACH MOTILITY
00981* 00986* 01179 01274* 01470* 01874 01875 01889
02187* 02263* 02381 03681* 04586 06376* 06378* 08136*
08336* 09798* 09823 09944* 09947* 09958* 10138* 10152
10759* 10791
PRIMARY MALABSORPTION
09491
PROLAPSE
01327 06624 08024 09279
PROLAPSE,RECTUM
00587 03231 03249 04137 04143 05025 05968 06011
06883 09541 10465
PROSTHESIS,ESOPHAGUS
03888 04760 07574 08343
PROTEASE
06417*
PROTEIN ABSORPTION
02053* 02054* 02739* 03623* 03640* 03663 03664 03665
04539* 04540* 04552 04555 04556 04975* 05927* 05933
05935 05937 07246* 08135 08616* 09022* 09032 09937*
PROTEIN DEFICIENCY
01057* 01058* 01842* 02727 07031 08988*
PROTEIN DIGESTION
03915 06414* 07462 08166*
PROTEIN METABOLISM
00048* 01929 02079* 02741* 02891* 02892* 03797* 05589
05597 05606* 07191 07462 08135 08939* 09095 10014*
10096 10111 10113* 10123* 10401* 10542
PROTEIN METABOLISM,LIVER
00693 02009 02010 02464 02469 02741* 02836* 02842*
02854* 02863* 03343* 03457* 03465 03763 03764 03769
03789 04267* 04275* 04312 04321 04334 04650* 04652*
05419 05455 05544* 05556* 05572 05573 05589 06314*
06321 06333 06434* 06441* 06459* 06499 06670 06986
07314* 07346* 07385 07396 07416 07901* 08237* 09155
09161 09165 09403
PROTEIN SECRETION,PANCREAS
00628* 02829 08200* 10007*
PROTEIN SYNTHESIS
00045* 00176* 01059* 01099 01663* 01671* 01913* 01938*
02057* 02068 07355 09086* 09174* 10108
PROTEIN SYNTHESIS,LIVER
01084* 01976* 01994 02005 02006 02007 02008 02011
02874 04647* 05544* 06462* 07316* 07334* 07358 07368
07376 07384 07434 07435 08229* 08253 08867* 09159
09160 10054* 10091
PROTEIN-LOSING ENTEROPATHY
00564 00877 01404 01766 02054* 02340 02649 02800*
03203 03203 04096 04111* 04456* 04481 04488 04781*
04811 04975* 04980 04995 04996 05779 05933 05935
06298 06824 10390* 10847
PROTEINS
00170 02341
PROTEINS,LIVER
00019* 00673 00750 01518 03452* 04655 07383
PROTEINS,PLASMA
02087* 02746* 03826* 04781* 07250*
PROTEINS,SERUM
00067* 01603* 01758 02467 02469 03114 03289* 03345*
03452* 03727 03904* 04693* 04702* 05189 05648* 05654*
06063* 06107 06206 06258* 09697 09820 10714* 10751
PROTEINURIA
04360
PSEUDOCYSTS,PANCREAS
02413 02414 07802 08740* 09608 09612 10508* 10509*
PSEUDOMEMBRANOUS ENTEROCOLITIS
00886 07186
PSYCHOLOGICAL FACTORS
00129 00130 00171 00460* 00500 00501 00610* 00880
00982* 00991* 00994 01348* 01349* 01350* 02324 03118*
03137 04001 04005 04040 04103* 04437 04805 04844*
04848* 05006* 05368 05494* 06052* 06158 06757 07194
08025 08051 08139* 08394* 08487* 08557 08950 10291
10854
PSYCHOLOGICAL STUDIES
SEE PEPTIC ULCERS
SEE ULCERATIVE COLITIS
PSYCOTHERAPY
09596
PYLORIC ANTRUM
07268* 07627* 09211* 09957* 09961* 09990* 10215
PYLORIC STENOSIS
00413 03835* 03901* 03901* 04828 06614* 07534* 07546
07577* 07610 07617* 08391* 08394* 08400 08472 09335
10213 10221 10239
PYLOROPLASTY
00442* 00443* 00450* 01357 02260* 02265* 06649 06688*
06700* 07611 07622* 08137* 08455 08496 08510 08513
08515 09283 09288* 09422 10077* 10196* 10197* 10282*
10309

PYLORUS
00106 00257* 01273* 01884 01885 02096* 02216* 09345
10148
PYLORUS OBSTRUCTION
01010* 02195 03050* 03159 08623* 10197*
PYLORUS SPHINCTER
00441* 02770 05767* 09944*

RADIATION EFFECTS ON LIVER
01555* 06478 06479 06485
RADIATION THERAPY IN CANCER TREATMENT
02199 02200 02201 02202 02378
RADIATION,TOXIC EFFECTS OF
SEE ALSO TOXIC EFFECTS ON ABSORPTION
SEE ALSO TOXIC EFFECTS ON BILIARY TRACT
SEE ALSO TOXIC EFFECTS ON ESOPHAGUS
SEE ALSO TOXIC EFFECTS ON GASTROINTESTINAL TRACT
SEE ALSO TOXIC EFFECTS ON LARGE INTESTINE
SEE ALSO TOXIC EFFECTS ON LIVER
SEE ALSO TOXIC EFFECTS ON PANCREAS
SEE ALSO TOXIC EFFECTS ON RECTUM
SEE ALSO TOXIC EFFECTS ON SMALL INTESTINE
SEE ALSO TOXIC EFFECTS ON STOMACH
00026 00028 00095* 00347 00702* 00826* 00924 01455
01571 01572 02200 02309 03565 03804* 04024* 04258*
04271* 04333 04673* 04674* 04964 05364 05607* 06337
06368* 06777 06843 07046 07334* 07402 07449* 07463
07664 07689 07843* 08040 08841 09058* 09165 09167
09466 09714* 09937* 10156 10255 10342* 10430* 10445
10642
RADIOISOTOPE STUDY TECHNIQUES
SEE ALSO TRACER STUDIES
07820*
RADIOLOGY IN BLEEDING DIAGNOSIS
03848 07580* 08309 10151 10358
RADIOLOGY IN CANCER DIAGNOSIS
06561 06687* 06909 06979 07604 07614 07823* 08014*
08434 08766* 09367 09674 09793*
RADIOLOGY IN JAUNDICE DIAGNOSIS
06551 10669
RADIOLOGY IN PEPTIC ULCER DIAGNOSIS
07630 08516
RADIOLOGY IN ULCERATIVE COLITIS DIAGNOSIS
08722*
RADIOLOGY,ABDOMEN
SEE ALSO ABDOMEN DIAGNOSIS
01701 01715 01716 02124 02679 02988 03861 06453*
07162 07195 07520 08663 09219 09302* 09624
RADIOLOGY,ANUS
SEE ANUS DIAGNOSIS
RADIOLOGY,BILIARY TRACT
SEE ALSO BILIARY DISEASE DIAGNOSIS
00333 00341 00626* 00776* 01203* 01247 01248 01254
01257 01258 01262 01645 02157 02158 02161 02164
02585 02586 02594 02976 03511 03512 03517 03839
03854 04421* 04707 06246 09826
RADIOLOGY,DUODENUM
00297 00497 02118 02137 02275 03161 07525 07682
07750 08315 08404 08447 08581 08597 09432* 09438
09442 09609 09794* 10330* 10798
RADIOLOGY,ESOPHAGUS
00279 00373 01290 02110 02212 02965* 02977 03018
03032 03892 04699* 04742 05383 05472 05745 06537*
06575 06576 06577 06601 06604 06605 07519 07536*
07538* 07551 07552 07565 07573 08344 08364 09240*
09241* 09242* 09250 09272 10138* 10139 10168 10186
10187 10194
RADIOLOGY,GALLBLADDER
SEE ALSO GALLBLADDER DISEASE DIAGNOSIS
00336 00337 00786 00824 01253 01256 01261 01643
02106* 02169 02939 02963 02967 03532 03544 03841
03853 03858 04417* 04428 04446 04454 05297* 05311
05660* 05708 05710 06222* 06534* 08004 08892 08915
10790
RADIOLOGY,GASTROINTESTINAL
SEE ALSO GASTROINTESTINAL DIAGNOSIS
00107 00345 00346 00347 00851 00859 01267 01277
01710 01714 02168 02173 02175 02180 02183 02317
02941 02944 02972 04093 04490 04493 04709 04711
05660* 05667 05713 06527* 06546 06744* 07527 08032
08302 08325 08331 09230 09283 09855 10381 10816*
RADIOLOGY,LARGE INTESTINE
00318 00319 00567* 01226 01227 01228 01230 01231
01452 02128 02129 02130 02131 02132 02133 02923
02934 02945 03226* 03255 03261 03303 03863 04102*
04167 05034 05036 05063 05685 05999 06376* 06564
06833* 06835* 06837* 06838* 06857 06864 06876 06877
06878 06879 06880 06908 06909 06912 06913 07494
07748 07780 08644* 08659* 08710 08711 08722* 09520*
09521* 09523* 09576 10146 10340* 10341* 10449 10464
10492 10500* 10502*
RADIOLOGY,LIVER
SEE ALSO LIVER DIAGNOSIS
00328 01241 01242 01243 01704 02145 02487 02619*
02836* 02866 02914* 02929 02933 02940 02947 02948
02953 02955 02958 02959 02962 02982 02985 02986
RADIOLOGY,LIVER
CONTINUED
02990 03344* 03360 03400 03479 03483 03823 03833*
03844 03845 03859 03862 04282 04283 04286 04291
04305 04692* 04708 05155* 05184 05202 05296* 05656*
05701 05702 05704 05705 05709 06087 06104 06116
06124 07003 07823* 07857 07878 07979* 08297 08299
08300 08327 08768* 08794 08806 09205* 09218 09224
09226 09655* 09887 10563* 10572* 10577* 10578* 10621
RADIOLOGY,MESENTERY
05686 07173
RADIOLOGY,PANCREAS
SEE ALSO PANCREAS DISEASE DIAGNOSIS
02981 03315 03320 03845 04697* 05691 05693 05694
05695 06037 06528* 08295* 08321 08737 08738 09224
10154 10525
RADIOLOGY,PERITONEUM
SEE ALSO PERITONEUM DIAGNOSIS
07516
RADIOLOGY,RECTUM
03270 06845 06907 06910 08687
RADIOLOGY,SALIVARY GLAND
04460* 09223 09224 09869
RADIOLOGY,SMALL INTESTINE
SEE ALSO SMALL INTESTINE DISEASE DIAGNOSIS
00309 00310 00318 01218 02100* 02119 02122 02127
02318 02897* 02942 02973 02974 03164 03327* 04039
04045 04070* 04075 04102* 04232 04536* 04557 04695*
04937 05383 05682 06536* 06734 06751 06796 06797
06814* 06954 07498 08530* 08598 08608 09483* 10334*
10337* 10340* 10341* 10351
RADIOLOGY,STOMACH
SEE ALSO STOMACH DISEASE DIAGNOSIS
00286 00297 00396 00423 00447* 01212 01214 01216
01217 01218 01297* 01327 01879 02116 02118 02137
02275 02771 02931* 02960 02964 02980 03086 03089
03104 03123* 03612 03835* 03836* 03860 03864 03866
04232 04713 04800 04855* 05383 05664 05667 05668
05670 05672 05673 05675 05776 05841 06384 06525*
06533* 06562 06629 06631 06632 06640 06671 06672
06673 06675 06676 06727 07589 07601 07612 07632
08315 08388* 08404 08414 08446 08450 08457 09253
09304* 09333 09365 09367 09369 09385 09672 09946*
10157 10197* 10218 10222 10235 10242 10281*
RADIOTHERAPY
00424 07088* 09937* 10255 10539 10548
RADIOTHERAPY IN CANCER TREATMENT
01288 01289 01436 01439 01467 01519 01520 06933
07569 08363 09146 10191 10430* 10447 10816*
RECTOCOLONIC POLYPOSIS
06836* 07737 08685 08714 09552
RECTUM
SEE HEMORRHOIDS
SEE ULCERATIVE COLITIS
RECTUM ANOMALIES
03217* 03218* 03237 04188 05642* 06851 06896 07741
RECTUM BIOPSY
00618 06839* 06856 06914* 07497 07725* 09471* 09584*
09594 10434*
RECTUM CANCER
03233 03238 03239 03247 03248 03269 03270 03276
03278 03280 03281 04110* 04116* 04118* 04119* 04121*
04151 04152 04153 04155 04156 04169 04171 04183
04205* 05008* 05015* 05017* 05050 05948* 05950* 05954*
05996 06834* 06894 06903 07768 09529 09540 09558
09569 10478 10480 10481 10493
RECTUM CYSTS
10495
RECTUM DIAGNOSIS
04150 05644* 05683 06853 06889 06911 08695 09559
RECTUM DISEASES
00599 04124* 04197 05683 06881 06890 06895 07746
07771 08704 09588 10433* 10453
RECTUM ENDOSCOPY
06910
RECTUM FISTULAS
00588 06845 06896 10435*
RECTUM HISTOLOGY
00573* 00584 04197 04523 06911
RECTUM IN CHILDREN
05068 05968 05996 06856 06883 06888 06902 07741
09557 10487
RECTUM INJURIES
02392 05070 07758
RECTUM MORPHOLOGY
00021* 04523 07214 08695
RECTUM MOTILITY
00122 01006 01421* 01894 03694
RECTUM MUCOSA
02387 02390 04558
RECTUM NEOPLASMS
01437 01438 02389 06888 07729* 08671
RECTUM NEOPLASMS,BENIGN
06850 06853 07723*

RECTUM NECPLASMS,MALIGNANT
00584 00585 00607 02130 02351* 02376 02390 02391
06836* 06844 06846 06889 07733 07735 07743 07753
07759 07775 08697 09508* 09518* 09559 09568 10429*
10437* 10447 10456 10473
RECTUM NECPLASMS,VILLOUS
07774 08716 09560 10485
RECTUM POLYPS
00607 03206* 03221* 03223* 03233 04150 05008* 05014*
05015* 05039 09515* 10429* 10456 10485
RECTUM PROLAPSE
00587 03231 03249 04137 04143 05025 05968 06011
06883 09541 10465
RECTUM RADIOLOGY
03270 06845 06907 06910 08687
RECTUM SURGERY
00566* 03217* 03231 03247 03269 03277 03278 04135
04152 04153 04182 04183 04193 05025 05050 05950*
06011 06852 06902 07723* 07729* 07739 07778 07785
08054 08677 09529 09540 09569 09570 10428* 10437*
10465 10478 10480
RECTUM TRAUMA
00566* 01454
RECTUM TREATMENT
03248 03281 04156 04193 05070 05954* 10432*
RECTUM ULCERS
03246 10435*
RECTUM,AGE EFFECTS ON
07214
RECTUM,TOXIC EFFECTS ON
01455
RECURRENT ULCER,GASTRECTOMY-INDUCED
04860* 07624* 08503
REFLUX,ESOPHAGUS
00281 00364* 00365* 00366* 00367* 00381 00382 00384
01276 01297* 02187* 02188* 02189* 02992* 02996* 02997*
03001* 03004* 03005* 03009* 03014 03015 03018 03022
03044 03869* 03870* 04724* 04725* 04728* 04730* 04732*
04733* 04734 04747 04748 04758 04763 05721* 05731
05751 06584 06602 07549 07557 08136* 08335* 09247
09966* 10138* 10165* 10170 10173
REGENERATION,LARGE INTESTINE
05013* 05612
REGENERATION,LIVER
00199* 00201* 00202* 00205* 01088* 01090* 01091* 01092*
01150 01151 01152 01153 01154 01977* 02045 02046
02461 02506 02510 02839* 02840* 02841* 02854* 02860*
02861* 02864* 02865 02866 03740* 03741* 03743* 03747*
03748* 03750* 03751* 03753* 03759* 03763 03765 03781
03787 04636* 04652* 04656 05539* 05545* 05549* 05556*
05558* 05561 05563 05571 05587 05593 06435* 06461*
06471 06478 06487 06492 06497 07038* 07147 07323*
07335* 07347* 07376 07378 07379 07443 07446 08217*
08258 08263 08828* 09111* 09119* 09148 09159 09164
09168 09632* 09638* 09908 10025* 10082 10087 10089
10090
REGENERATION,PANCREAS
01820 01821 02816* 04629* 04630* 06429
REGENERATION,STOMACH
05506* 05607* 09895*
REGIONAL ENTERITIS
00541* 00544 01680* 01714 02320* 02322* 02323 02324
02382 02396* 03182* 03183 03184 03287* 03295 03296
04044 04069* 04070* 04071* 04072 04073 04074 04075
04076 04794 04966* 04967* 04969 05913* 05914* 05915*
05916 05918 05919 05980 06013 06746* 07670 07699*
07790* 08601* 08606 08643* 08743* 09476 10391* 10392*
10395
REGIONAL ENTERITIS DIAGNOSIS
04968* 05911* 05920
REGIONAL ENTERITIS TREATMENT
05917 06021*
REGIONAL ENTERITIS,DISEASES ASSOCIATED WITH
02099* 02319* 02325 04968* 05914* 07704 08601* 08643*
08743*
REGIONAL ILEITIS
01794 06802 06807 07570 07704 08605* 09925*
RESECTION-INDUCED SECONDARY MALABSORPTION,INTESTINAL
06737* 06786 06818* 07705* 08520* 10418
RESPIRATORY COMPLICATIONS
06580 06588 06594 06595 07539* 07956* 08367 08456
08524* 09277 09358 10585*
RESPIRATORY SYSTEM
03870* 07469 07621* 08757* 09042 09889 10298
RETICULOENDOTHELIAL SYSTEM,LIVER
05404* 07314* 07319* 07843* 08765* 09506 10091 10623
RHYTHM,CIRCADIAN
00018* 00235 01090* 01095 01807* 06484 07380 08151*
08283 08995 09929* 09954* 10017*
ROTORS SYNDROME
10612
RUPTURE,DIAPHRAGM
03935 10650
RUPTURE,DUODENUM
07676 07678 10357
RUPTURE,ESOPHAGUS
00360* 01278 02193 02195 03872 03881 04750 06570*
07554 07555 07561 10172
RUPTURE,LIVER
01503 04304 04468 06106 07006 07899* 07900* 08836
09706
RUPTURE,PANCREAS
07799 07818

SALIVA
00123 00128 02782* 04593* 07470 07472* 08153* 08157
08158 09951* 09992*
SALIVARY GLAND BIOCHEMISTRY
07797
SALIVARY GLAND CHEMICAL COMPOSITION
00125
SALIVARY GLAND DISEASES
00841 03566 04460* 08831 08938* 09591 09992*
SALIVARY GLAND ENZYMES
02781* 05417* 08152* 08156 09054* 09055* 10815*
SALIVARY GLAND HISTOLOGY
01830 06400 08156
SALIVARY GLAND IMMUNOLOGY
06399* 08155*
SALIVARY GLAND METABOLISM
01902* 01904 03695* 03696 07470 07471 08151* 08152*
08157 08160
SALIVARY GLAND MORPHOLOGY
00022 00023 00912 00913 05417*
SALIVARY GLAND NEOPLASMS
00839 00840 04199 04457* 09869
SALIVARY GLAND NEOPLASMS,MALIGNANT
00762* 01725
SALIVARY GLAND RADIOLOGY
04460* 09223 09224 09869
SALIVARY GLAND SECRETION
00123 00124 00125 00126 00127 00128 00129 00130
00842 01847* 01901 01902* 01903* 01904 02781* 02782*
03685 03695* 03696 03697 04592* 04593* 05489* 06398*
06399* 06402* 06416* 07472* 07474* 08152* 08154* 08155*
09052* 09054* 10121* 10815*
SALIVARY GLAND SURGERY
00842
SALIVARY GLAND ULTRASTRUCTURE
00911 00914 03695* 04517 05484 06303* 07471 08090
08160
SALIVARY GLANDS IN CHILDREN
10815*
SALIVARY GLANDS,DISEASES ASSOCIATED WITH
00825*
SALIVARY GLANDS,DRUG EFFECTS ON
04593* 06303*
SALIVARY GLANDS,NERVOUS CONTROL OF
08090 09052*
SALMONELLOSIS
SEE ALSO TYPHOID FEVER
01773 01775 02633 02643 09842* 09853
SALMONELLOSIS CARRIER STATE
06300 09879
SALMONELLOSIS DIAGNOSIS
02610* 09844*
SALMONELLOSIS EPIDEMIOLOGY
01776 02671 07165
SALMONELLOSIS IN CHILDREN
05349
SALMONELLOSIS PATHOLOGY
04210* 04211* 04212* 06266 06300 07656*
SALMONELLOSIS TREATMENT
07093* 09879
SALT ABSORPTION,BILE
00942* 00958* 07254* 07982* 08113* 09912* 09919*
SALT METABOLISM,BILE
04648* 08521* 10020* 10120* 10586*
SARCOIDOSIS
00513 00677 01487* 05639* 05914* 06916* 07164 07860
08350 08432 08795 09478 10555*
SARCOMA
07660 07775 07972* 08383 08397 08736 10249 10523
10764* 10816*
SCANNING,SCINTILLATION
00269* 00327 00691 01244 01245 01246 02114 02135
02136 02142 02144 02148 02149 02181 02182 03827*
03833* 03840 03842 03843 03844 03845 03862 04279
04283 04305 04322 04557 04708 04713 04720 05184
05202 05296* 05647* 05652* 05668 05691 05694 05695
05700 05702 05705 06042 06052* 06084 06114 06369*
06523* 06535* 06540* 06552 06560 06561 06565 06566
06931 06932 06967* 06981 06983 06984 07118 07491*
07517 07529 07872 07949 08299 08300 08321 08327
08710 08770 08806 09218 09224 09226 09610 09656*
09674 10154 10222 10578* 10621 10636

SCHISTOSOMIASIS
02185 02694 03914 05396 06089 08068 08996 08999
09881 10642 10861
SCHISTOSOMIASIS DIAGNOSIS
00359 01791 10636
SCHISTOSOMIASIS IMMUNOLOGY
02691
SCHISTOSOMIASIS PATHOLOGY
03596* 04497* 05144* 06291 08065* 08066* 08073 09660
09886 10750 10866 10867
SCHISTOSOMIASIS TREATMENT
00898 03597*
SCINTILLATION SCANNING
00269* 00327 00691 01244 01245 01246 02114 02135
02136 02142 02144 02148 02149 02181 02182 03627*
03833* 03840 03842 03843 03844 03845 03862 04279
04283 04305 04322 04557 04708 04713 04720 05184
05202 05296* 05647* 05652* 05668 05691 05694 05695
05700 05702 05705 06042 06052* 06084 06114 06369*
06523* 06535* 06540* 06552 06560 06561 06565 06566
06931 06932 06967* 06981 06983 06984 07118 07491*
07517 07529 07872 07949 08299 08300 08321 08327
08710 08770 08806 09218 09224 09226 09610 09656*
09674 10154 10222 10578* 10621 10636
SCLERODERMA
00872 01711 03561 03891 10810*
SECRETIN
SEE ALSO PANCREAS
00087* 00148* 00175* 00186 00187 01037 01053* 01054*
01055* 01065 01910* 01911* 01915* 01916* 01948 01949
01960* 02154 02818* 02828 02830 04531* 04597* 04606*
04624* 04625* 04626* 04627* 04628* 04631* 04685 05095*
05121* 05499* 05530* 05533* 05646* 06301* 06508* 07089*
07286* 07303* 07307* 07310* 08177* 08192 08198* 08205*
08208 09067* 09073* 09094 09138* 09213* 09618* 09968*
09981* 09983* 10001* 10010* 10100* 10101* 10103*
SECRETION DISORDERS,STOMACH
06524* 08474 09209* 10250
SECRETION IN DISEASE,STOMACH
03130* 06695* 06712 06735 07300 07583* 07584* 07586*
09830 10265
SECRETION STUDY TECHNIQUES
00123 00124 00186 00189 00190 07474* 08206 08232*
09202*
SECRETION STUDY TECHNIQUES,STOMACH
00354 01195* 04611 04614 06401* 06414* 06524* 06735
09969* 09988* 09993* 09998 10261
SECRETION,BICARBONATE
05498*
SECRETION,BILE
00187 00194* 00197* 00792 00793 01026* 01071* 01072*
01076* 01077* 01080* 01086* 01142 01145 01148 01949
01956* 01959* 01961* 01968* 02038 02249* 02582 02644*
02850* 03710* 03744* 03755* 03760* 03771 04248 04637*
04642* 04667 05529* 06446* 06448* 06449* 06450* 06452*
06463* 06473 06480 06496 06508* 07095 07104* 07310*
07326* 07348* 07349* 07473* 07867 07973* 08219* 08232*
08246* 08266 08884* 09089* 09092* 09104* 09105* 09120*
09122* 09136* 09645* 09896* 10026* 10034* 10037* 10044*
10064* 10088 10120*
SECRETION,DRUG EFFECTS ON BILE
02591 03757* 06465* 07315* 07338* 08244* 08884* 09153
SECRETION,DRUG EFFECTS ON STOMACH
00133* 00135* 00136* 00140* 00142* 00147* 00149* 00150*
00155 00160 00161 00393* 00485 00488 01009* 01017*
01020* 01021* 01023* 01024* 01025* 01027* 01028* 01031*
01032* 01033* 01040 01041 01334* 01347* 01862* 01920*
01923 01924 02785* 02787* 02792* 02798* 02799* 02801
02803 02805 02807 02808 02809 02811 02814 03054*
03133* 03701* 03703* 03708* 03714* 03723 03728 03729
04603* 04609* 04610 05485 05487* 05488* 05505* 05508*
05510* 05515 05519 05820* 05832* 06401* 06405* 06409*
06410* 06420 06690* 06696* 06704 07280* 07290* 07298
08184* 08489 09069* 09070* 09072* 09081 09171* 09994*
09997
SECRETION,DUODENUM
01914* 02048* 02789* 07307* 09088* 09173* 10107
SECRETION,ELECTROLYTE
01161* 10121*
SECRETION,GALLBLADDER
01363 01958* 02578* 02596 07339* 09805*
SECRETION,GASTROINTESTINAL
00167 00887 01177* 01178* 01188 01189 01199* 02657
02658 02783* 02784 02904* 04594 06418 07461 08159
SECRETION,HORMONAL CONTROL OF
00167 01026* 01910* 01949
SECRETION,HORMONAL CONTROL OF STOMACH
00156 00164 00486 01011* 01027* 01030* 01040 01041
01042 01906* 01909* 01911* 01912* 01915* 01919* 01930
01950* 02048* 02249* 02252* 02254* 02256* 03703* 03956
03956 04853* 04856* 04907 05857 06405* 06410* 06413*
07281* 07289* 07292* 08165* 08171* 08185* 08192 09061*
09980* 09991* 10100* 10107
SECRETION,HORMONAL CONTROL OF STOMACH ACID
00131* 00132* 00133* 00136* 00137* 00143* 00145* 00146*
00148* 00157 00158 00159 00163 00165 00166 01913*
01914* 01916* 05496*
SECRETION,LARGE INTESTINE
02351* 06515 07459 10106*
SECRETION,LIVER
03742* 06496 07370 10024* 10032* 10092
SECRETION,LIVER ENZYME
09639*
SECRETION,NERVOUS CONTROL OF STOMACH
00154 01015* 01018* 03702* 04853* 05486* 05493* 05497*
05502* 05828* 06413* 07283* 08161* 08187* 09065* 09075*
09978*
SECRETION,PANCREAS
00011* 00085 00174* 00175* 00180 00181 00183 00186
00189 00907* 00962 01049* 01052* 01054* 01055* 01056*
01059* 01060 01061 01934* 01945 01946 01947 01948
01949 02620* 02657 02658 02716* 02818* 02823* 02826
02827 02828 02831 02832 02833 03304* 03648* 03710*
03731* 03732* 03734* 03735* 03737* 04248 04615* 04617*
04619* 04621* 04622* 04623* 04624* 04625* 04627* 04628*
04631* 05095* 05121* 05226* 05450* 05485 05505* 05529*
05530* 05531* 05532* 05533* 06035* 06259* 06426* 06427*
06428 06431 06745* 07286* 07473* 07794* 07796 08197*
08201* 08206 08208 08750 09085* 09088* 09096 09098
09099 09100 09896* 10010* 10011*
SECRETION,PANCREAS AMYLASE
00268* 00639* 01050* 01938* 02817* 02820* 04615* 04617*
04689* 04690* 05119* 05123* 05526* 08203* 09999* 10009*
SECRETION,PANCREAS BICARBONATE
00182 01910* 01911* 01935* 01941* 01942* 02134 07303*
08197* 08198* 08201* 09089* 09092* 09213* 10007*
SECRETION,PANCREAS ELECTROLYTE
00628* 01941* 01942* 08205*
SECRETION,PANCREAS ENZYME
00176* 00177* 00178* 00185 01053* 01057* 01063 01933*
01936* 01937* 01939* 01943 02816* 02817* 02822* 08198*
08202* 08204* 08207 09092* 09620* 10008* 10012* 10013*
10014* 10339*
SECRETION,PANCREAS LIPASE
00179* 00188 02815* 03734* 03736* 03737* 04616* 05527*
05537 08203* 09089* 09618* 09999*
SECRETION,PANCREAS PHOSPHOLIPASE
01932* 04620*
SECRETION,PANCREAS PROTEIN
00628* 02829 08200* 10007*
SECRETION,PANCREAS TRYPSIN
01051* 01062 02817* 05534* 07308*
SECRETION,SALIVARY GLAND
00123 00124 00125 00126 00127 00128 00129 00130
00842 01847* 01901 01902* 01903* 01904 02781* 02782*
03685 03695* 03696 03697 04592* 04593* 05489* 06398*
06399* 06402* 06416* 07472* 07474* 08152* 08154* 08155*
09052* 09054* 10121* 10815*
SECRETION,SMALL INTESTINE
00007* 00061* 00236 01160* 01161* 01162 01369* 02608*
02888* 02900 03697 03713* 03796* 03806 03814 03815
04508* 04582* 04594 04599* 04670* 04685 04774* 06035*
06301* 06340 06507* 06510* 07153* 07247* 07459 08169*
08582 09003* 10007* 10106* 10339*
SECRETION,STOMACH
00162 00169 00170 00477 00495 01010* 01012* 01019*
01023* 01029* 01037 01039 01043 01060 01208 01301*
01325 01335* 01346* 01909* 01917* 01919* 01920* 01920*
01921 01922 01925 01927 01928 01930 01930 01931
02219* 02222* 02247 02255* 02270 02271 02744* 02785*
02789* 02793* 02794* 02795* 02797* 02799* 02803 02804
02806 02808 02809 02810 02813 03114 03604* 03697
03719 03720 03723 03727 03814 04594 04610 04613
04614 04816 05350 05485 05489* 05492* 05498* 05505*
06305* 06410* 06416* 06606* 07226 07271* 07282* 07283*
07285* 07286* 07291* 07300 07602 07625* 08116* 08129*
08161* 08163* 08174* 08190 08191 08192 08193 08195
08415 08470 08483* 08484* 09059* 09064* 09065* 09066*
09068* 09082 09215 09320 09374 09935* 09987* 09990*
09996 10265 10268* 10296 10783
SECRETION,STOMACH ACID
00134* 00138* 00139* 00141* 00142* 00144* 00147* 00150*
00152* 00153 00168 00294 00300 00301 00302 00367*
00383 00444* 00448* 00449* 00451* 00492 00625* 00727
00918 01011* 01013* 01014* 01015* 01016* 01018* 01022*
01026* 01034* 01035* 01195* 01209 01274* 01300* 01329*
01343* 01344* 01905* 01906* 01907* 01908* 01910* 01912*
01918* 01923 01924 01931 01935* 02117 02134 02252*
02253* 02272 02756* 02785* 02786* 02787* 02788* 02790*
02791* 02792* 02798* 02800* 02801 02802 02805 02807
02811 02812 02814 02850* 02916* 02931* 02949 03048*
03081 03107 03121* 03123* 03127* 03128* 03129* 03130*
03132* 03133* 03143 03145 03587 03588 03698* 03699*
03701* 03702* 03703* 03705* 03706* 03707* 03708* 03710*
03712* 03713* 03714* 03715* 03716* 03717* 03721 03724
03726 03730 03828* 03856 03903* 03904* 03912* 03937
03941 03972* 03987 04267* 04507* 04596* 04599* 04602*
04604* 04606* 04609* 04611 04612 04769* 04774* 04775*
04779* 04783 04786 04816 04828 04844* 04848* 04852*

SECRETION,STOMACH ACID
CONTINUED
04853* 04856* 04859* 04862* 04874 04878 04885 05166
05314 05340* 05341* 05435* 05486* 05487* 05488* 05494*
05495* 05496* 05497* 05498* 05499* 05500* 05501* 05502*
05504* 05507* 05508* 05509* 05510* 05512 05513 05515
05516 05517 05518 05519 05520 05521 05523 05627*
05768* 05773* 05777 05779 05819* 05820* 05826* 05829*
05832* 05838 05853 05854 05860 05871 06259* 06401*
06402* 06403* 06404* 06405* 06406* 06407* 06408* 06409*
06419 06420 06422 06669 06745* 07280* 07281* 07284*
07287* 07289* 07290* 07292* 07293* 07296* 07310* 07586*
07616* 07621* 07630 07635 08137* 08164* 08165* 08167*
08169* 08171* 08173* 08174* 08175* 08176* 08177* 08179*
08181* 08184* 08185* 08186* 08187* 08194 08289* 08314
08427 08477* 08480* 08489 08509 09058* 09060* 09061*
09063* 09067* 09069* 09070* 09071* 09072* 09074* 09075*
09078* 09171* 09211* 09231 09232 09289* 09379* 09380*
09383* 09399 09475 09842* 09873 09967* 09968* 09969*
09970* 09973* 09974* 09975* 09976* 09977* 09978* 09979*
09981* 09983* 09986* 09988* 09989* 09991* 09993* 09994*
09997 09998 10167* 10198* 10244 10261 10269* 10271*
10273* 10278* 10283* 10317 10324 10328 10335*
SECRETION,STOMACH ELECTROLYTE
00139* 00140* 00150* 00164 00625* 02921 08205* 08290*
09063* 09067* 09084 09976*
SECRETION,STOMACH LIPASE
01036* 01347*
SECRETION,STOMACH MUCUS
00002* 00012* 00013* 00161 00166 00390* 01024* 01031*
01045 03705* 06686* 06698* 08161* 08168* 08178* 08405
08479* 09077* 09830 09979* 09980* 09982* 09992* 10280*
SECRETION,STOMACH PEPSIN
00148* 00149* 00150* 00166 00486 01009* 01030* 01905*
01906* 03712* 03713* 05499* 07288* 07293* 08167* 09062*
09063* 09067* 09070* 09377* 09970* 09971* 09976* 09986*
09994* 10314 10404*
SECRETOR STATUS,BLOOD GROUP
06399* 07477* 08517 09987*
SEROLOGICAL DIAGNOSIS
09763 10149
SEROTONIN
SEE ALSO CARCINOID SYNDROME
01341* 04502* 04645* 06372* 08180* 08979 10335*
SERUM AMYLASE
00268* 01198* 03355* 09087* 09142 09197* 09639* 10003*
10137* 10533* 10536*
SERUM BILE PIGMENTS
02447* 02835* 04311 04704* 05307 09204* 09214* 09680
10073* 10612 10613 10617
SERUM BILE PIGMENTS IN JAUNDICE
00274* 02845* 02851* 04419* 05546* 06964* 08758*
SERUM CHOLESTEROL
02578* 02745* 03421* 03426* 03642* 04263* 04967* 07009
07465 07531 07711* 07973* 09801* 10050*
SERUM ELECTROLYTES
06162* 06194* 06722 06780 08205* 08917 10426*
SERUM ENZYMES
01342* 01945 02522 03046* 03361 03526 03573 04298
04317 04368 04416* 04606* 04694* 04703* 04712 04849*
04854* 05119* 05210* 05523 05616 05658* 06145* 06154
06168* 07011 07094* 07483* 08286* 08859 08888* 08895
08935* 08936* 09788 10143 10546
SERUM ENZYMES,LIVER
SEE ALSO ALKALINE PHOSPHATASE
SEE ALSO LIVER DISEASE DIAGNOSIS
00274* 01050* 06443* 06526* 06558 06980 07367 07484*
07506 07822* 07831* 07834* 07934 10066* 10067* 10074*
10085 10574* 10629 10630 10631 10680* 10689* 10702
10811*
SERUM HEPATITIS
00709* 00714 00718 00719 00720 00723 01580* 01581*
01596 02521 02537 02539 02540 02549 02553 03420*
03422* 03423* 03425* 03433 03441 03447* 04270* 04330*
04345* 04347* 04348* 04352 04355 04358 04361 04366
04374 04691* 05220* 05221* 05223* 05225* 05228 06167*
06169* 06170 06181 06184 07056 07062 07070 07909*
07910* 07915* 07917* 07918* 07920* 07921* 07930 08851
08861 09732* 09733* 09734* 09757 09768 10685* 10689*
10693* 10695* 10697 10712
SERUM IRON
03475 06663 07073
SERUM PROTEINS
00067* 01603* 01758 02467 02469 03114 03289* 03345*
03452* 03727 03904* 04693* 04702* 05189 05648* 05654*
06063* 06107 06206 06258* 09697 09820 10714* 10751
SEX FACTORS
01118 01121 01953* 02101* 02255* 07345* 10501*
SHIGELLOSIS
SEE ALSO DYSENTERY
01773 01774 02614* 09936*
SHIGELLOSIS DIAGNOSIS
02610*
SHIGELLOSIS EPIDEMIOLOGY
00882 00884
SHIGELLOSIS IMMUNOLOGY
05337*
SHIGELLOSIS IN CHILDREN
08943
SHIGELLOSIS TREATMENT
00883 05346
SHOCK
01732 02030 02031 02085* 05570 05616 05629 07252*
08527* 08573 08739* 08842 08997 09172*
SHUNT,PORTACAVAL
00748 00749 01607* 01609* 01919* 02082* 02083* 02444*
02559* 02915* 03367 03368 03370 03453* 03454* 03455*
03470 03471 03472 04265* 04292* 04396 04402 04652*
05151* 05166 05274 05554* 06062* 06072* 06124 06187*
06196 06203 06597 07526 07847* 07966 07967 08754*
09123* 09187* 09275 09644* 09789 10021* 10161* 10590*
10604 10611 10637 10667 10670 10725* 10728* 10735*
SHUNT,SPLENORENAL
08384 10580* 10727*
SIGMOID
SEE ALSO LARGE INTESTINE
01229 01719 04126 06017 06868 06893 06899
SIGMOIDITIS
07723* 07786
SIGMOIDOSCOPY
07482*
SJOGRENS SYNDROME
00654* 03566 04460* 08938* 09203* 10812*
SMALL INTESTINE
SEE ALSO DUODENUM
SEE ALSO ENTERITIS
SEE ALSO ILEOCECAL VALVE
SEE ALSO ILEUM
SEE ALSO ILEUS
SEE ALSO INTUSSUSCEPTION
SEE ALSO JEJUNUM
SEE ALSO MALABSORPTION
SEE ALSO PEPTIC ULCERS
09463
SMALL INTESTINE ABSORPTION
00036* 00042* 00043* 00044* 00047* 00050* 00052* 00054*
00055* 00056* 00057* 00065* 00066* 00070 00073 00076
00078 00079 00080 00081 00082 00196* 00276* 00766*
00889 00939* 00940* 00941* 00943* 00944* 00945* 00946*
00947* 00950* 00953* 00956* 00957* 00958* 00959* 00961
00962 00963 00964 00966 00967 00973 01816 01817
01832* 01834* 01835* 01836* 01838* 01839* 01840* 01841*
01842* 01843* 01844* 01845* 01846* 01852 02063 02081*
02290* 02291* 02315 02333* 02628 02734* 02736* 02737*
02738* 02743* 02745* 02746* 02747* 02750 02774 02845*
02912* 03150* 03185* 03188* 03547* 03601* 03601* 03622*
03623* 03624* 03625* 03626* 03629* 03631* 03632* 03633*
03634* 03636* 03637* 03638* 03639* 03640* 03642* 03643*
03645* 03649* 03650 03651 03652 03653 03654 03655
03656 03657 03660 03661 03662 03663 03664 03665
03672* 03793* 03794* 04025 04077* 04078* 04079* 04080*
04082* 04101 04210* 04211* 04212* 04510* 04530* 04531*
04532* 04533* 04534* 04535* 04536* 04538* 04539* 04540*
04542* 04544* 04546* 04547* 04548* 04549* 04550* 04552
04553 04555 04556 04557 04559 04560 04622* 04670*
04914* 04917* 04919* 04970* 04972* 04975* 04976* 04977*
04978* 04979 04981 04983 04994 04999 05288* 05413*
05437* 05438* 05439* 05440* 05441* 05442* 05443* 05444*
05445* 05446* 05447* 05448* 05449* 05452* 05453* 05454*
05456 05457 05458 05462 05463 05465 05603* 05619
05893 05915* 05921* 05923* 05927* 05931 05934 05936
05937 05942 06036* 06185* 06290* 06343* 06344* 06346*
06347* 06352* 06360 07236* 07237* 07240* 07241* 07242*
07244* 07246* 07247* 07249* 07252* 07253* 07254* 07255*
07256 07257 07259 07260 07696 07719 08112* 08113*
08114* 08115* 08117* 08118* 08120* 08121* 08122* 08123*
08125* 08126* 08131 08577 09024* 09026* 09029* 09030
09033 09433* 09844* 09911* 09917* 09918* 09919* 09920*
09921* 09923* 09926* 09929* 09932* 09938* 09939* 10385
SMALL INTESTINE ANGIOGRAPHY
00520 00522 02121 04912* 04915* 05904 06772 07227
08563
SMALL INTESTINE ANOMALIES
02286* 02305 02306 02674 03167 04029 04047 04061
04064 04916* 04932 04933 04949 04961 05360 05867
05884 05889 05903 05910 07649* 08620* 10350 10360
SMALL INTESTINE ATRESIA
00502* 00532 01367* 01368* 01377 05883 05903 07687
09450 09453 09456
SMALL INTESTINE BIOCHEMISTRY
00046* 00829* 01055* 02334* 02608* 02734* 02735* 02893*
02894* 03619 06364 08284* 10099* 10339*
SMALL INTESTINE BIOPSY
00311 00312 00313 00547* 00550* 01393* 01399* 01402
01403 02050* 02319* 02322* 03825* 04048 04716 04926
04927 04977* 04990 05638* 05939 07500 07649* 07709*
07715 08633 09235 09455 09483* 10142 10336* 10374
10410* 10814* 10859*

SMALL INTESTINE CANCER
02680 03158 03162 03163 03165 03168 03171 03305*
03850 03960 04039 04043 04058 04062 04083* 04914*
04928 04950 05885 05892 05894 05897 05904 05905
05910 08586
SMALL INTESTINE CARBOHYDRATE METABOLISM
03190* 04019* 04080* 04091 04546*
SMALL INTESTINE CARCINOGENESIS
04050
SMALL INTESTINE CIRCULATION
00240* 00529 01801* 04028 04046 04465 04549* 04550*
04912* 04929 04940 04945 04955 04966* 05446* 05470*
05624* 05625* 05628* 05889 05907 06517* 07227 07643
07654* 07659 08123* 09037* 09041 09185* 09190* 09191*
09923* 09928*
SMALL INTESTINE CYSTS
05882 07648*
SMALL INTESTINE DEVELOPMENT
03664 03792* 03809 04681 07220 09015 09016 09169*
09922*
SMALL INTESTINE DIAGNOSIS
00257* 00263* 00264* 00276* 00306 00308 00310 00311
00312 00313 01196* 01197* 01221 01222 01223 01225
02098* 02100* 02101* 02103* 02122 02123 02124 02125
02126 02127 02285* 02286* 02303 02308 02319* 02322*
02325 02913* 02922 02961 02973 02974 03077 04055
04070* 04548* 04686* 04695* 04912* 04937 05637* 05638*
05639* 05640* 05641* 05680 05681 05682 05874 05895
05897 05904 05920 06523* 06736* 06801* 06811* 07156*
07673 07690 08293* 08294* 08531* 08564 08640 09199*
09428* 09431* 09471* 10337*
SMALL INTESTINE DISACCHARIDASES
00236 00560 01157* 01158* 02329* 02339 03202 05641*
07451* 08618* 08988* 09027* 09460* 09499 09782* 09910*
10122* 10399* 10403* 10408* 10412*
SMALL INTESTINE DISEASE DIAGNOSIS
03825* 04695* 04710 04716
SMALL INTESTINE DISEASE EPIDEMIOLOGY
00545* 00546* 00556 01662* 02327* 02332* 02333* 02336*
08603* 08605* 08622*
SMALL INTESTINE DISEASE ETIOLOGY
02323 02337 08562 10388*
SMALL INTESTINE DISEASES
02634 02697 03151 03155 03166 03181 04057 04086
04794 04921 04952 04957 04963 05640* 05874 05875
05887 05890 05893 05895 05896 05899 06260* 06296
06738* 06745* 06750 06773 06788 06789 06817* 06820
06826 07151* 07198* 07652* 07667 07683 07685 07687
07691 07711* 08016* 08428 08458 08521* 08522* 08551
08555 08556 08558 08564 08565 08566 08567 08574
08577 08617* 08619* 08628 08634 08755* 08850 09426*
10120* 10402* 10804* 10860* 10865
SMALL INTESTINE DIVERTICULA
02310 02311 03150* 03151 03175 04037 04061 04067
04938 04944 04958 05877 06760 07679 08579 08627
09465
SMALL INTESTINE DIVERTICULITIS
00524 10356
SMALL INTESTINE ENDOSCOPY
00305 00306 00315 08553 08738 09212*
SMALL INTESTINE ENZYMES
00060* 00230* 00231* 00233 00507* 00828* 01155* 01156*
01397* 01802* 02047* 02049* 02051* 02074 02102* 02674
02748* 02822* 02889* 02890* 02893* 02899 02912* 03191*
03192* 03601* 03607* 03619 03651 03794* 03797* 03800*
03801* 03810 03811 03813 04046 04503* 04669* 04672*
04675* 04676* 04678* 04680 04681 04971* 04974* 04982
05601* 05603* 05604* 05605* 05610* 05616 05618 05620
05854 05922* 05923* 05937 05938 06035* 06308* 06310*
06311* 06339 06507* 06512* 06513* 07094* 07188 07222
07242* 07451* 07452* 07457 07492* 08092 08093 08108
08284* 08286* 08288 09169* 09170* 09175* 09485 09500
09906 10099* 10104* 10105* 10110 10111 10126*
SMALL INTESTINE FISTULAS
01372 03157 04088 04920 04956 05864* 05876 06809
07131 07664
SMALL INTESTINE HISTOLOGY
00043* 00313 00554 00555 00826* 00905* 01803* 02060
02709* 02894* 03607* 03610 03619 03803* 04669* 04684
04926 04971* 06357 07216 07218 07252* 09003* 09004
09015 09179* 09940* 09959* 10342* 10379 10408*
SMALL INTESTINE IMMUNOLOGY
00070 00535 00558 02058* 03149* 03187* 03796* 03807
04508* 04676* 04972* 04976* 05611 05887 05926* 05930*
06738* 07450* 10106*
SMALL INTESTINE IN CHILDREN
00311 00312 00313 01368* 01375 01376 01405 02305
03191* 03228* 03662 03825* 04031 04063 04065 04926
04927 04930 04965 05631 05680 05867 05886 05903
05905 05907 05909 05919 06544 06769 06820 07191
07666 08615* 08633 09454 10115* 10343* 10360 10368
10402*
SMALL INTESTINE INJURIES
04048 04922 04925 04964 05880 05888 05907 05908
07649* 07692 08559 10143
SMALL INTESTINE LIPID METABOLISM
00015* 02735* 03791* 03793* 03798* 03799* 03805 03812
04082* 04094 04960
SMALL INTESTINE METABOLISM
00232* 01155* 01158* 01159* 01163 01164 01165 01379
01602* 01671* 02047* 02049* 02055* 02056* 02057* 02059
02060 02069 02074 02747* 02748* 02889* 02891* 02892*
02894* 02896* 02901 02902 02903 02903 03639* 03649*
03762* 03797* 04670* 04671* 04675* 04677* 04679 04680
04681 04974* 04975* 05609* 05617 05619 05870 07204*
07448* 07453* 08082* 08084* 08119* 08151* 08522* 09147
09174* 09176 09178 09917* 09972* 10102* 10105* 10108
10126* 10858*
SMALL INTESTINE MICROORGANISMS
00535 00536 00537 00551* 00990* 01680* 02052* 02098*
02284* 02287* 02607* 02609* 02889* 03124* 04081* 04082*
04085 04089 04134 04677* 04682 04683 04979 05348
05398 05608* 05631 05637* 05640* 07456 07466 07476*
07658* 07954* 08287 08578 08986* 09182* 09604 09841*
09845* 10114* 10115* 10415*
SMALL INTESTINE MORPHOLOGY
00007* 00008* 00026 00027 00053* 00058* 00059* 00230*
00308 00507* 00889 00902* 00903* 00922 00924 00927
01801* 01803* 01815 01816 01817 02051* 02059 02291*
02315 02331* 02634 02708* 02709* 02912* 03792* 04024*
05411* 05412* 05413* 05414* 05428 05432 05437* 05602*
05606* 05868 05924* 06290* 06308* 06309* 06784 07153*
07207* 07222 07238* 07656* 07719 08068 08093 08287
08621* 09896* 09903 09904 09911* 10102*
SMALL INTESTINE MOTILITY
00091* 00093* 00094* 00096* 00097* 00106 00110 00111
00112 00113 00118 00597 00986* 00987* 00988* 00989*
00990* 00997 00998 00999 01000 01001 01817 01864*
01866* 01867* 01881 01883 01887 01890 01891 01892
01893 02127 02288* 02721 02758* 02759* 02760* 02761*
02773 02774 02775 02776 02777 02778 02913* 03668*
03672* 03673* 03674* 03675* 03676* 03677* 03684 03686
03687 03692 03693 03909* 04020* 04022* 04562* 04566*
04567* 04568* 04569* 04573* 04574* 04575* 04578* 04579*
04582* 04584 04589 04591 04923 04936 05412* 05414*
05470* 05480 05482 05628* 06370* 06371* 06372* 06373*
06374* 06375* 07270* 07278 07279 08141* 08519* 09037*
09041 09044 09551 09942* 09943* 09945* 09949* 09950*
09951* 09958* 09960*
SMALL INTESTINE MUCOSA
00311 00509* 00512 00565 00829* 00830* 00888 00890
00904* 00926 00927 00973 00990* 01395* 01397* 01399*
01400* 01402 01414 01666* 01782* 01816 02047* 02053*
02054* 02056* 02291* 02708* 02734* 02889* 03191* 03672*
03798* 03805 04079* 04508* 04515 04522* 04671* 04676*
04680 04786 04927 04971* 05428 05438* 05442* 05452*
05453* 05619 05620 05623* 06307* 06338 06361 06511*
06778 07448* 07454* 07708* 08064* 09941
SMALL INTESTINE MUCOSAL INJURIES
00028
SMALL INTESTINE NEOPLASMS
00520 01381 01382 01390 02294 02304 04955 06795
07690 08599 08718 09423* 09431* 09462
SMALL INTESTINE NEOPLASMS,BENIGN
00521 01389 02302 03117 06751 06787 07662 09446
SMALL INTESTINE NEOPLASMS,MALIGNANT
00508* 00511 00516 00518 00519 00543 01383 01384
01385 01386 01387 01388 02292 02293 02295 02296
02301 02325 06764 06767 06771 06772 06787 06810
07653* 07681 07708* 08570 08580 08588 08594 09443
09470 10370 10377
SMALL INTESTINE NEOPLASMS,VILLOUS
10375
SMALL INTESTINE OBSTRUCTION
00095* 00310 00503* 00510* 00518 00524 00528 01369*
01370* 01866* 02104* 02168 02285* 02286* 02287* 02308
02974 03164 03180 04015* 04017* 04020* 04026 04027
04030 04035 04038 04051 04054 04055 04059* 04060
04065 04912* 04913* 04916* 04918* 04930 04939 04942
04947 04948 04954 04956 04961 04962 05380 05680
05681 05766* 05862* 05865* 05874 05878 05879 05891
05900 05901 05902 05906 05919 06542 06544 06752
06759 06776 06793 07191 07648* 07653* 07665 07671
07673 07795* 08424 08529* 08539 08540 08541 08543
08547 08592 08595 08600 08610 08612 08627 09425*
09430* 09436 09439 09448 09466 09888 09943* 10340*
10341* 10355 10361 10363 10368 10378 10382 10385
SMALL INTESTINE PATHOLOGY
02289* 04994 07500 07648* 08077* 08519* 08526* 08531*
08566 09933* 09936*
SMALL INTESTINE PERFORATION
00525 02314 03167 04031 04049 04925 04951 04965
05905 05908 05916 06761 06769 06782 07702 08507
08541 08981 09302* 10372 10391*
SMALL INTESTINE PERFUSION
04953
SMALL INTESTINE POLYPS
04052 04173 04931 05886 08528* 08531* 08561 09535
10366

SMALL INTESTINE RADIOLOGY
SEE ALSO SMALL INTESTINE DISEASE DIAGNOSIS
00309 00310 00318 01218 02100* 02119 02122 02127
02318 02897* 02942 02973 02974 03164 03327* 04039
04045 04070* 04075 04102* 04232 04536* 04557 04695*
04937 05383 05682 06536* 06734 06751 06796 06797
06814* 06954 07498 08530* 08598 08608 09483* 10334*
10337* 10340* 10341* 10351
SMALL INTESTINE SECRETION
00007* 00061* 00236 01160* 01161* 01162 01369* 02608*
02888* 02900 03697 03713* 03796* 03806 03814 03815
04508* 04582* 04594 04599* 04670* 04685 04774* 06035*
06301* 06340 06507* 06510* 07153* 07247* 07459 08169*
08582 09003* 10007* 10106* 10339*
SMALL INTESTINE STRICTURE
00527 01394* 02306 02307 03131* 03169 03997 04023*
04047 04913* 06765 07810 08448 08562 08590 10514
SMALL INTESTINE SURGERY
00091* 00504* 00505* 00629* 01022* 01366* 01379 02051*
02284* 02286* 02288* 02303 02320* 02321* 02745* 02758*
03124* 03149* 03152 03154 03156 03288* 03305* 03802*
04016* 04021* 04025 04028 04032 04034 04036 04040
04041 04042 04066 04094 04686* 04832 04860* 04916*
04917* 04919* 04924 04934 04935 04941 04943 04946
04951 04959 04960 05150* 05603* 05637* 05868 05869
05870 05871 05872 05881 05898 05911* 05945* 06076*
06392 06431 06477 06737* 06742* 06743* 06746* 06755
06756 06770 06774 06786 06788 06798* 06806 06880
06926* 07150* 07649* 07650* 07651* 07669 07671 07675
07680 07698* 07699* 07700* 07702 07705* 08089* 08141*
08523* 08538 08554 08569 08572 08573 08575 08596
08601* 08602* 08623* 08662 09027* 09117* 09179* 09185*
09425* 09430* 09444 09474 09475 10117* 10284* 10332*
10333* 10335* 10343* 10347 10350 10354 10385 10391*
10394 10430* 10509* 10760* 10792 10807* 10808*
SMALL INTESTINE SURGERY COMPLICATIONS
04027 05861* 05863* 05869
SMALL INTESTINE TRANSPLANTATION
01000 02758* 03149* 03610 03631* 03873 03884 04021*
04022* 04959 06309* 06925* 06928* 06942 07240* 07456
07647* 08077* 10362
SMALL INTESTINE TRAUMA
02897* 04922 04925 04964 05880 05888 05908 06352*
06753 06790
SMALL INTESTINE TREATMENT
03153 03157 04015* 04017* 04026 04041 04073 05873
05883 06738* 06799* 06800* 06826 07697* 07698* 07699*
07701 07790* 08604* 08613 09449 09452 10396
SMALL INTESTINE ULCERS
00309 00435* 00436* 00527 01380 01394* 02289* 03132*
03836* 03906* 03959 04018* 04695* 06783 08498 08534
09848*
SMALL INTESTINE ULTRASTRUCTURE
00008* 00015* 00045* 00508* 00536 00555 00565 00904*
00925 00926 01157* 01370* 01387 01414 01784* 01802*
01804* 02708* 02721 02735* 02743* 02894* 02898* 03601*
03602* 03610 03622* 03626* 03792* 04503* 04508* 04510*
04513 04515 04522* 04536* 05413* 05430 05432 05437*
05438* 05447* 05922* 05925* 05926* 06301* 06307* 06310*
06311* 06338 06345* 06352* 06507* 06509* 06739* 06747
07204* 07205* 07216 07219 07224 07232 07449* 07655*
08075* 08082* 08084* 08089* 08119* 08582 09016 09028*
09179* 09484* 10342*
SMALL INTESTINE VOLVULUS
04056 04947 05867 06736* 07661 07694 08587 08623*
10340* 10341* 10383
SMALL INTESTINE,AGE EFFECTS ON
03801* 03811 04684 06347* 07220 09003* 09019 09170*
10104* 10108 10122* 10399*
SMALL INTESTINE,ALCOHOL EFFECTS ON
01669* 02896* 05454* 05601* 07453*
SMALL INTESTINE,DISEASES ASSOCIATED WITH
00512 00513 00538 00868 01371* 01666* 01667* 02290*
02293 02300 07707* 08526* 08537 09468 10410*
SMALL INTESTINE,DRUG EFFECTS ON
00093* 00114 00528 00530 00531 00925 00943* 00948*
00951* 00990* 01161* 01380 01844* 02057* 02760* 02888*
02899 02912* 03633* 03675* 03794* 03797* 03806 03808
03815 04050 04503* 04533* 04546* 04562* 04569* 04670*
04671* 04963 05463 05480 05602* 05623* 05624* 05866
05873 05915* 06370* 06371* 06390 06697* 07204* 07207*
07270* 07578* 08151* 09484* 09904 09960* 10379
SMALL INTESTINE,DRUG TREATMENT OF
00544 00551* 01393* 03152 04804 05865* 05913* 08666
09583*
SMALL INTESTINE,FOREIGN BODIES IN
03159 03167 04049 06782
SMALL INTESTINE,HORMONAL CONTROL OF
00236 00237 01160* 02048* 02759 03660 03797* 03800*
04672* 04685 05443* 05875 06372* 06389 06510*
SMALL INTESTINE,NERVOUS CONTROL OF
00092* 00094* 00989* 02777 04023* 04574* 05412* 05414*
05602* 05623* 05624* 06371* 06374* 08143* 08146 09004
09019 09044 09960*
SMALL INTESTINE,TOXIC EFFECTS ON
00026 00048* 00826* 02309 02341 04673* 04674* 04963
05430 05866 05873 05915* 06337 06777 07205* 07238*
07449* 07655* 09058* 09466 10342* 10430*
SMOOTH MUSCLE
00915
SMOOTH MUSCLE MORPHOLOGY
03606* 07264* 09902
SMOOTH MUSCLE MOTILITY
02987 09051
SMOOTH MUSCLE PHARMACOLOGY
08095 09948* 09950* 09960*
SMOOTH MUSCLE PHYSIOLOGY
01868* 01870* 02721 02754* 02773 02994* 03036 03609*
03666* 03674* 03675* 03679* 03684 03687 03694 04563*
04564* 04567* 04568* 04569* 04571* 04572* 04573* 04578*
04580* 04581* 04584 04585 04587 04589 04591 05411*
05412* 05414* 05415* 05468* 05469* 05481 07264* 07265*
07475* 09046 09051 09129* 09924* 09948* 09949* 09952*
09964
SODIUM
01014* 01846* 09939*
SODIUM ABSORPTION
00069 00077 01843* 03632* 03641* 04551 05458 07247*
07262 07455 08133 09023* 09920* 09923* 09934*
SPHINCTER OF ODDI
SEE ALSO BILIARY TRACT
00107 00534 00770* 00814 01257 01258 03527 04445
04575* 05328 05471* 06246 06379* 07110* 08886* 09127*
09796* 09799* 09812 09823 10338* 10761* 10784
SPHINCTER,ANUS
03280 04135 04152 04188 06892 08660* 10442* 10443*
SPHINCTER,ESOPHAGUS
02211 02752* 02768 02769 02772 02992* 03001* 03009*
03024 03025 03688 04564* 04565* 04570* 04587 04727*
04727* 04729* 05466* 05472 05473 08020* 08136* 08336*
09961*
SPHINCTER,PYLORUS
00441* 02770 05767* 09944*
SPLEEN
00408 01398* 02145 02150 03818* 03867* 05404* 05649*
06190* 06192* 06205 09886
SPLENOMEGALY
01613 02450* 02486 08384 10632
SPLENOPORTOGRAPHY
03839 05649* 05709 07005 07022 07828* 07839* 07965
08311 08815 09304* 10552* 10594
SPLENORENAL SHUNT
08384 10580* 10727*
SPRUE
03195 03196 03198 04914* 04978* 05926* 05932 06814*
07708* 09485
SPRUE,TROPICAL
00545* 00546* 01197* 01392* 02332* 02333* 02334* 02335*
02336* 03189* 03199 04081* 04100 04990 04992 04999
06811* 06816* 07712* 08624 10406* 10415*
STAINING TECHNIQUES
00260* 01207* 01951* 08094 08395* 09010 09017 09901
10167* 10557*
STAPHYLOCOCCAL ENTEROCOLITIS
08657*
STARVATION
00507* 01665* 04520 05422 05543* 05546* 05605* 05606*
06439* 07312* 07344* 07381 07421 07452* 07824* 08124*
08172* 08216* 08237* 09086* 09166 10012* 10073* 10102*
STEATORRHEA
00261* 00264* 00525 00562 01207* 01268 01392* 01670*
02330* 02335* 03200 04079* 04101 04914* 04971* 04988
05099* 05141* 05338* 05637* 05922* 05926* 05930* 05935
06044 06257* 07722 08617* 08630 08639 08889 08932*
09472* 09481* 09489 09841* 10414* 10419 10424 10846
STEATOSIS
02569 06960* 10563*
STEATOSIS,ALCOHOLIC
08856
STENOSIS,PYLORIC
00413 03835* 03901* 03901* 04828 06614* 07534* 07546
07577* 07610 07617* 08391* 08394* 08400 08472 09335
10213 10221 10239
STEROID EXCRETION
09579
STEROID METABOLISM
03639*
STEROID METABOLISM,LIVER
01623* 03784 04353 06432* 07331* 07333* 07350* 07403
08231* 08276 10029* 10049*
STEROIDS
SEE ALSO CORTICOSTEROIDS
SEE ALSO LIVER CHOLESTEROL METABOLISM
01739 02042 02043 02044 02396* 02576* 02785* 04018*
04124* 04273* 04458* 05913* 07001 08211 08260 08479*
08843 09420 09671 10292 10537* 10717* 10783
STOMACH
SEE BEZOARS

STOMACH
CONTINUED
SEE GASTRITIS
STOMACH ABSORPTION
00068 03635* 05434* 05435* 05436* 06341* 07236* 08120*
08180* 08389* 09036 09062* 09362 09926*
STOMACH ACID SECRETION
00134* 00138* 00139* 00141* 00142* 00144* 00147* 00150*
00152* 00153 00168 00294 00300 00301 00302 00367*
00383 00444* 00448* 00449* 00451* 00492 00625* 00727
00918 01011* 01013* 01014* 01015* 01016* 01018* 01022*
01026* 01034* 01035* 01195* 01209 01274* 01300* 01329*
01343* 01344* 01905* 01906* 01907* 01908* 01910* 01912*
01918* 01923 01924 01931 01935* 02117 02134 02252*
02253* 02272 02756* 02785* 02786* 02787* 02788* 02790*
02791* 02792* 02798* 02800* 02801 02802 02805 02807
02811 02812 02814 02850* 02916* 02931* 02949 03048*
03081 03107 03121* 03123* 03127* 03128* 03129* 03130*
03132* 03133* 03143 03145 03587 03588 03698* 03699*
03701* 03702* 03703* 03705* 03706* 03707* 03708* 03710*
03712* 03713* 03714* 03715* 03716* 03717* 03721 03724
03726 03730 03828* 03856 03903* 03904* 03912* 03937
03941 03972* 03987 04267* 04507* 04596* 04599* 04602*
04604* 04606* 04609* 04611 04612 04769* 04774* 04775*
04779* 04783 04786 04816 04828 04844* 04848* 04852*
04853* 04856* 04859* 04862* 04874 04878 04885 05166
05314 05340* 05341* 05435* 05486* 05487* 05488* 05494*
05495* 05496* 05497* 05498* 05499* 05500* 05501* 05502*
05504* 05507* 05508* 05509* 05510* 05512 05513 05515
05516 05517 05518 05519 05520 05521 05523 05627*
05768* 05773* 05777 05779 05819* 05820* 05826* 05829*
05832* 05838 05853 05854 05860 05871 06259* 06401*
06402* 06403* 06404* 06405* 06406* 06407* 06408* 06409*
06419 06420 06422 06669 06745* 07280* 07281* 07284*
07287* 07289* 07290* 07292* 07293* 07296* 07310* 07586*
07616* 07621* 07630 07635 08137* 08164* 08165* 08167*
08169* 08171* 08173* 08174* 08175* 08176* 08177* 08179*
08181* 08184* 08185* 08186* 08187* 08194 08289* 08314
08427 08477* 08480* 08489 08509 09058* 09060* 09061*
09063* 09067* 09069* 09070* 09071* 09072* 09074* 09075*
09078* 09171* 09211* 09231 09232 09289* 09379* 09380*
09383* 09399 09475 09842* 09873 09967* 09968* 09969*
09970* 09973* 09974* 09975* 09976* 09977* 09978* 09979*
09981* 09983* 09986* 09988* 09989* 09991* 09993* 09994*
09997 09998 10167* 10198* 10244 10261 10269* 10271*
10273* 10278* 10283* 10317 10324 10328 10335*
STOMACH ACID SECRETION,HORMONAL CONTROL OF
00131* 00132* 00133* 00136* 00137* 00143* 00145* 00146*
00148* 00157 00158 00159 00163 00165 00166 01913*
01914* 01916* 05496*
STOMACH ANGIOGRAPHY
02088 02233 04818 06630
STOMACH ANOMALIES
01295 01302 02242 03063 03074 03085 03161 03875
04782 04785 04790 04821 05765* 05766* 05780 05803
05807 05816 06038 08429 08455 09333 09362 10233
STOMACH ATRESIA
05803 05816
STOMACH BIOCHEMISTRY
00170 00918 01038 01044 01045 02812 03621 09982*
09984* 09985* 09987* 09995*
STOMACH BIOPSY
00290 00298 00484 01813 02111 02248 02957 03865
04705* 04716 04771* 04840 05669 05671 05676 05677
05783 05817 06676 06678 06699* 07599 08313 08416
08422 09293* 09295* 09347 09375 10250 10259 10316
STOMACH CANCER
00408 02434* 02646 02653 02956 02957 02960 02964
02968 02980 02983 03047* 03057* 03058* 03064 03075
03078 03079 03080 03082 03084 03086 03088 03090
03091 03094 03095 03096 03097 03099 03100 03101
03105 03108 03109 03111 03114 03115 03122* 03545*
03905* 03916 03918 03919 03920 03921 03927 03928
03929 03933 03934 03939 03948 03950 03951 03952
03954 03960 03962 04037 04133 04696* 04772* 04777*
04779* 04784 04793 04799 04801 04806 04807 04808
04813 04834 04839 04841 05654* 05666 05672 05673
05674 05676 05678 05742 05769* 05775 05776 05778
05789 05795 05798 05799 05800 05801 05804 05805
05806 05809 05811 05812 05814 05815 05844 06607*
06610* 06616* 06621* 06632 06647 06655 06657 06660
06661 06664 06667 06668 06674 06677 06684* 07589
07605 07612 07614 08369 08396 08399 08402 08423
08431 08437 08450 08452 08453 08454 08460 08469
08476 08819 09303* 09308 09318 09322 09323 09330
09352 09353 09354 09355 09357 09360 09547 10141
10178 10190 10192 10199* 10204* 10205 10227 10229
10231 10232 10252 10259
STOMACH CARCINOGENESIS
02225 06608* 07590
STOMACH CHEMICAL COMPOSITION
06618* 09077*
STOMACH CIRCULATION
01175* 01179 01908* 01918* 01923 02088 02262* 03702*
03818* 04818 04834 05426 05626* 05632 05820* 06404*
06519* 08104 09008 09074* 09075* 09973* 10207
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03949 03966 04842
STOMACH CYSTS
03102 03110
STOMACH DEVELOPMENT
04527 04601* 04605* 05425
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00257* 00259* 00282 00283 00264 00285 00286 00287
00288 00289 00290 00291 00292 00293 00294 00295
00296 00298 00299 00300 00301 00302 00303 00352
00408 00848 01195* 01208 01209 01210 01211 01212
01213 01214 01215 01217 01219 01220 01306 01307
01308 01310 01311 01946 02096* 02110 02111 02112
02113 02114 02115 02116 02117 02921 02927 02949
02956 02957 02980 02983 02987 03047* 03065 03074
03077 03828* 03832* 03838 03860 03866 03910* 03923
03933 03950 03951 03952 03961 03962 03969* 04696*
04705* 04778* 04793 04840 04842 04843 05503* 05504*
05635* 05636* 05654* 05662 05663 05664 05665 05666
05668 05669 05670 05671 05672 05673 05674 05675
05676 05677 05679 05700 05774* 06563 06607* 06625
06647 06674 06679 06687* 06694* 07487* 07496 07596
07600 08191 08289* 08290* 08294* 08296 08314 08324
08412 08415 08427 08564 09209* 10203* 10206 10296
STOMACH DIAGNOSIS,GASTRIC ANALYSIS IN
08173* 09374 10141 10223
STOMACH DILATATION
06646
STOMACH DISEASE DIAGNOSIS
02960 02964 02968 03835* 03852 03923 04713 04716
04718
STOMACH DISEASE EPIDEMIOLOGY
01311 01315 01317 03057* 03907* 03957 08440 08441
08442 09418
STOMACH DISEASE ETIOLOGY
01299* 01323 02791*
STOMACH DISEASES
00284 00411 00413 00483 02223* 02983 03104 03561
03901* 04781* 04783 04794 04811 04819 04851* 05783
05808 05813 06075* 06105 06628 06629 06630 06634
06637 06639 06642 06651 06662 06745* 08405 08412
08420 08428 08438 08439 08443 08444 08450 08458
08509 08564 08565 08566 08567 09271 09319 09321
09336 09337 09418 09440 10173 10199* 10242 10243
10264
STOMACH DIVERTICULA
00414 00415 00416 00523 02243 10218 10245
STOMACH ELECTROLYTE SECRETION
00139* 00140* 00150* 00164 00625* 02921 08205* 08290*
09063* 09067* 09084 09976*
STOMACH ENDOSCOPY
00255* 00282 00283 00284 00285 00286 00287 00288
00289 00298 00424 01331* 04718 04840 05635* 05782
05817 06651 06678 06679 07501 08291* 08419 08422
08565 09229 09292* 09338 10148 10199*
STOMACH ENZYMES
00152* 00172 00484 00487 01045 01920* 01927 01928
01929 02793* 02794* 02799* 02806 02917* 03704* 03718
03762* 04006 04596* 04600* 04602* 04603* 05490* 05491*
05511 06417* 07280* 07282* 07288* 07289* 07296* 07487*
08080* 08083* 08097 08471 08483* 09076* 09381* 09984*
09995* 10203* 10223
STOMACH FISTULAS
03946 06572 08029 08456 09395
STOMACH HISTOLOGY
00003* 00173 00291 00292 00390* 00404 00412 00434*
00452* 00484 00918 00919 01360 02237 02251* 02702*
02705* 02706* 02719 03621 03919 03952 03954 04504*
04505* 04507* 04528 04781* 06415* 06422 06607* 07226
07237* 07283* 07284* 07585* 08080* 08097 08107 08395*
09320 09895* 10203* 10282*
STOMACH IMMUNOLOGY
SEE ALSO GASTRIC PARIETAL-CELL ANTIBODY
SEE ALSO INTRINSIC FACTOR ANTIBODY
00428 02089 02095* 02219* 02222* 02791* 02906* 03700*
03709* 04600* 04607* 04815 06421 09076* 09298* 09901
STOMACH IN CHILDREN
01303 02240 03051* 03053* 03901* 04611 04613 04811
05810 06628 07588* 08291* 08394* 08404 08471 09082
09253 09302* 09310 09326 09346 09846* 10213
STOMACH INJURIES
01299* 04735 04767 04800 05785 05810 07608 10246
STOMACH INTRINSIC FACTOR
00483 01925 02095* 02254* 02255* 02791* 03604* 04600*
04601* 05501* 06524*
STOMACH LIPASE SECRETION
01036* 01347*
STOMACH METABOLISM
00172 00173 01046 01926 01929 02927 04843 04847*
05522 07625* 08083* 08170* 08174* 09060* 09078* 09954*
09972* 09977*
STOMACH MICROORGANISMS
05793 06402* 08419 09327 10131

STOMACH MORPHOLOGY
00003* 00014* 00021* 00024 00151* 00172 00420 00901*
00915 00917 00920 00921 01010* 01039 01792 01813
01814 01879 02089 02223* 02702* 02704* 02705* 03049*
03052* 03085 03089 03609* 03667* 04504* 04527 04819
05406* 05408* 05409* 05420 05426 05506* 05666 05679
05769* 05813 06302* 06304* 06306* 06315 07211 07627*
07628* 08078* 08099 10282* 10742
STOMACH MOTILITY
00088* 00103 00104 00105 00106 00163 00475 00983*
00984* 00995 00996 00997 00998 00999 01009* 01016*
01352* 01860* 01861* 01862* 01863* 01865* 01878 01879
01880 01881 01883 01886 01887 01888 01915* 02079*
02080* 02081* 02264* 02754* 02755* 02756* 02757* 02761*
02770 02771 02778 02797* 02905* 02987 03609* 03635*
03667* 03668* 03669* 03670* 03671* 03673* 03683 03692
03702* 03818* 03832* 03911* 03942 03993 04566* 04567*
04577* 04578* 04579* 04583 04589 04590 04780* 04814
04822 04910 05467* 05468* 05469* 05473 05479 05486*
05767* 06366* 06369* 06375* 06382 06383 06384 06386
06387 06388 06533* 06610* 07263* 07268* 07271* 07272
07273 07274 07277 07278 07279 07534* 07602 08129*
08137* 08138* 08140* 08144 08145 08147 08149 08425
08462 09039* 09042 09043 09048 09049 09050 09365
09944* 09946* 09947* 09948* 09957* 09961* 09963 09990*
10285*
STOMACH MUCOSA
00033* 00034* 00035* 00151* 00171 00173 00299 00412
00420 00421 00422 00423 00425 00433* 00484 00487
00511 01010* 01014* 01044 01046 01047 01048 01175*
01299* 01304 01359 01360 01811 01812 01908* 01912*
01918* 01923 02223* 02262* 02273 02703* 02704* 02705*
02707* 02796* 02800* 02808 03004* 03052* 03056* 03073
03218* 03237 03612 03617 03618 03621 03704* 03705*
03711* 03726 03730 03941 03954 04502* 04504* 04507*
04527 04541* 04605* 04778* 04785 04819 04858* 05319
05407* 05409* 05410* 05427 05434* 05436* 05493* 05506*
05519 05632 05679 05700 05763* 05833* 05856 06302*
06342* 06412* 06421 06525* 06609* 06618* 06624 06642
06672 06686* 07297* 07598 07615* 08107 08476 08499
09008 09077* 09873 09900 09954* 09977* 10208 10247
10278*
STOMACH MUCOSAL INJURIES
10251
STOMACH MUCUS SECRETION
00002* 00012* 00013* 00161 00166 00390* 01024* 01031*
01045 03705* 06686* 06698* 08161* 08168* 08178* 08405
08479* 09077* 09830 09979* 09980* 09982* 09992* 10280*
STOMACH NECROSIS
05785
STOMACH NEOPLASMS
00406 00407 01220 02233 06652 06653 07596 07603
08424 08436 08439 08443 08444 08473 09299* 09359
09363
STOMACH NEOPLASMS,BENIGN
00398 00402 00405 01312 02226 03117 03913 04778*
04837 06632 06640 06643 08414 08459 09315 09324
09373 10215 10216
STOMACH NEOPLASMS,MALIGNANT
00293 00363* 00389* 00390* 00391* 00396 00397 00399
00400 00401 00403 00404 00474 01287 01297* 01304
01305 01306 01307 01308 01309 01310 01311 01313
01314 01315 01316 02113 02114 02172 02217* 02218*
02219* 02224 02225 02227 02228 02229 02230 02231
02232 02292 06622 06635 06636 06656 06680* 06687*
07487* 07585* 07593 07594 07599 07604 07606 07632
08025 08388* 08390* 08397 08408 08432 08434 08435
08445 09244 09258 09292* 09298* 09300* 09301* 09306
09311 09314 09325 09339 09340 09344 09350 09372
09415 10189 10216 10217 10224 10225 10226 10230
10249
STOMACH OBSTRUCTION
04007 04790 04798 04835 05786 05788 07587*
STOMACH PATHOLOGY
00500 01878 02229 02237 03048* 04800 06662 07496
07598 08144 08290* 08395* 08418 08458 08476 08490
09292* 09296* 09318 09408 10240 10256 10258 10281*
10809*
STOMACH PEPSIN SECRETION
00148* 00149* 00150* 00166 00486 01009* 01030* 01905*
01906* 03712* 03713* 05499* 07288* 07293* 08167* 09062*
09063* 09067* 09070* 09377* 09970* 09971* 09976* 09986*
09994* 10314 10404*
STOMACH PERFORATION
00479 01303 03066 03922 03975 04002 04823 04889
04890 05804 08424 08430 09302* 09310 09346 10246
STOMACH PERFUSION
03719 04803 04834
STOMACH PHYSIOLOGY
03070 03071
STOMACH POLYPS
02238 03076 03083 03098 03905* 04173 04778* 04784
04840 05790 05799 08438 08449 08451 09303* 10253
10254 10281*
STOMACH RADIOLOGY
SEE ALSO STOMACH DISEASE DIAGNOSIS
00286 00297 00396 00423 00447* 01212 01214 01216
01217 01218 01297* 01327 01879 02116 02118 02137
02275 02771 02931* 02960 02964 02980 03086 03089
03104 03123* 03612 03835* 03836* 03860 03864 03866
04232 04713 04800 04855* 05383 05664 05667 05668
05670 05672 05673 05675 05776 05841 06384 06525*
06533* 06562 06629 06631 06632 06640 06671 06672
06673 06675 06676 06727 07589 07601 07612 07632
08315 08388* 08404 08414 08446 08450 08457 09253
09304* 09333 09365 09367 09369 09385 09672 09946*
10157 10197* 10218 10222 10235 10242 10281*
STOMACH REGENERATION
05506* 05607* 09895*
STOMACH SECRETION
00162 00169 00170 00477 00495 01010* 01012* 01019*
01023* 01029* 01037 01039 01043 01060 01208 01301*
01325 01335* 01346* 01909* 01917* 01919* 01920* 01920*
01921 01922 01925 01927 01928 01930 01930 01931
02219* 02222* 02247 02255* 02270 02271 02744* 02785*
02789* 02793* 02794* 02795* 02797* 02799* 02803 02804
02806 02808 02809 02810 02813 03114 03604* 03697
03719 03720 03723 03727 03814 04594 04610 04613
04614 04816 05350 05485 05489* 05492* 05498* 05505*
06305* 06410* 06416* 06606* 07226 07271* 07282* 07283*
07285* 07286* 07291* 07300 07602 07625* 08116* 08129*
08161* 08163* 08174* 08190 08191 08192 08193 08195
08415 08470 08483* 08484* 09059* 09064* 09065* 09066*
09068* 09082 09215 09320 09374 09935* 09987* 09990*
09996 10265 10268* 10296 10783
STOMACH SECRETION DISORDERS
06524* 08474 09209* 10250
STOMACH SECRETION IN DISEASE
03130* 06695* 06712 06735 07300 07583* 07584* 07586*
09830 10265
STOMACH SECRETION STUDY TECHNIQUES
00354 01195* 04611 04614 06401* 06414* 06524* 06735
09969* 09988* 09993* 09998 10261
STOMACH SECRETION,DRUG EFFECTS ON
00133* 00135* 00136* 00140* 00142* 00147* 00149* 00150*
00155 00160 00161 00393* 00485 00488 01009* 01017*
01020* 01021* 01023* 01024* 01025* 01027* 01028* 01031*
01032* 01033* 01040 01041 01334* 01347* 01862* 01920*
01923 01924 02785* 02787* 02792* 02798* 02799* 02801
02803 02805 02807 02808 02809 02811 02814 03054*
03133* 03701* 03703* 03708* 03714* 03723 03728 03729
04603* 04609* 04610 05485 05487* 05488* 05505* 05508*
05510* 05515 05519 05820* 05832* 06401* 06405* 06409*
06410* 06420 06690* 06696* 06704 07280* 07290* 07298
08184* 08489 09069* 09070* 09072* 09081 09171* 09994*
09997
STOMACH SECRETION,HORMONAL CONTROL OF
00156 00164 00486 01011* 01027* 01030* 01040 01041
01042 01906* 01909* 01911* 01912* 01915* 01919* 01930
01950* 02048* 02249* 02252* 02254* 02256* 03703* 03956
03956 04853* 04856* 04907 05857 06405* 06410* 06413*
07281* 07289* 07292* 08165* 08171* 08185* 08192 09061*
09980* 09991* 10100* 10107
STOMACH SECRETION,NERVOUS CONTROL OF
00154 01015* 01018* 03702* 04853* 05486* 05493* 05497*
05502* 05828* 06413* 07283* 08161* 08187* 09065* 09075*
09978*
STOMACH STRICTURE
05765*
STOMACH SURGERY
SEE ALSO GASTRECTOMY
00303 00411 00412 00456* 00474 00482 01298* 01325
01646* 02117 02214* 02227 02231 02232 02234 02235
02236 02237 02238 02242 02251* 02260* 02684 02797*
02927 02997* 03053* 03055* 03056* 03065 03069 03070
03082 03088 03090 03092 03112 03123* 03546* 03699*
03865 03866 03873 03898 03912* 03917 03922 03924
03925 03926 03931 03936 03937 03943 03944 03945
03947 03955 03961 03963 03964 03965 03990 03997
03998 04487 04608* 04682 04728* 04756 04767 04770*
04772* 04773* 04774* 04775* 04776* 04780* 04787 04789
04791 04797 04799 04809 04812 04829 04830 04831
04832 04833 04839 04843 04846* 04847* 04854* 04859*
04860* 04865 04872 04873 04924 04973* 05636* 05670
05744 05747 05751 05770* 05775 05778 05781 05787
05822* 05824* 05847 06612* 06631 06645 06656 07542*
07549 07566 07577* 07579* 07587* 07588* 07608 08348
08388* 08391* 08393* 08410 08420 08472 08669 08908
09083 09296* 09303* 09306 09341 09346 09357 09358
09365 09396 10111 10211 10214 10246 10254 10327
10549
STOMACH SURGERY COMPLICATIONS
00404 01212 01297* 01326 01327 01339* 01357 01885
01933* 02119 02221* 02259* 02261* 02263* 02265* 02267*
02268* 02276 02280 03068 03836* 03908* 03909* 03938
03942 03975 03983 03984 04001 04019* 04117* 04798
04817 04869 04870 05339* 05764* 05767* 05771* 05772*
05791 05792 05794 05796 05797 05805 05823* 05827*
05830* 05831* 05843 05844 06713 07618* 07623* 08392*
09244 09295* 09349 10196*

STOMACH SURGERY TECHNIQUES
00429 01324 01338* 05772* 07595 07611 08425 09288*
09400 10267*
STOMACH TRANSPLANTATION
03070 06419
STOMACH TRAUMA
02214* 02239 03081 03935 03943 03965 04824 04858*
05740 05773* 05810 09895*
STOMACH TREATMENT
00409 00425 00426 00431 02215* 03118* 03122* 04804
04823 09405 10207 10213 10237 10253
STOMACH ULCERS
00298 00400 00419 00620 00915 01217 01300* 01301*
01323 01346* 01361 02172 02219* 02220* 02251* 03048*
03050* 03058* 03059* 03103 03118* 03122* 03129* 03134
03142 03144 03145 03146 03836* 03874 03902* 03906*
03921 03956 03959 03965 03966 03969* 03975 03976
03977 03981 03984 03986 04002 04289 04788 04795
04802 04810 04814 04826 04834 04836 04841 04855*
04904 05339* 05811 05814 05817 05818* 05837 05842
05859 06675 06680* 06681* 06682* 06684* 06685* 06686*
06687* 06694* 06695* 06698* 06699* 06719 06973* 07584*
07613 07615* 07619* 07624* 07625* 08070 08389* 08463
08466 08478* 08481* 08482* 08485* 08499 08500 08516
08517 08518 09316 09334 09376* 09378* 09382* 09385
09387 09394 09395 09402 09406 09411 09413 09415
09895* 10278* 10287 10288 10291 10293 10299 10310
10316 10318 10332* 10817*
STOMACH ULTRASTRUCTURE
00002* 00421 00916 01812 01813 01814 02702* 02703*
02704* 02705* 02706* 02707* 02719 03103 03604* 03617
03618 04502* 04505* 04528 04781* 04862* 05406* 05407*
05408* 05409* 05410* 05425 05427 05430 07217 07297*
08075* 08078* 08080* 08097 08417 08499 09317 09394
09895* 09900
STOMACH VARICES
01277 06613* 07580* 07612 08446 09304*
STOMACH VOLVULUS
02240 02241 03932 03958 04827 06579 06644 07587*
07588* 09326 10219 10248
STOMACH,AGE EFFECTS ON
03986 03992 07627* 07628* 08147 08163*
STOMACH,ALCOHOL EFFECTS ON
01322 02220*
STOMACH,DISEASES ASSOCIATED WITH
01303 01314 01352* 02241 02246 02256* 03722 06648
06661 10201* 10208
STOMACH,DRUG EFFECTS ON
01044 01300* 01322 01323 01340* 01877 02258* 02273
02754* 02755* 02796* 02800* 03045* 03059* 03612 03724
03832* 03899* 03956 04566* 04788 04820 05410* 05434*
05467* 05469* 05486* 05493* 05503* 05626* 05808 06348*
06619* 06641 06698* 07263* 07297* 07578* 07581* 07592
08129* 08181* 08205* 08387* 08462 09048 09079* 09291*
09376* 09379* 09380* 09420 09948* 10243 10266* 10280*
10312
STOMACH,DRUG TREATMENT OF
01316 03054* 03068 03069 03071 03072 03106 03107
03591 04773* 04804 05777 06626 07592 08468 09079*
09296* 09319 09348 09377* 09419
STOMACH,FOREIGN BODIES IN
00409 03093 05781 09846*
STOMACH,HORMONAL CONTROL OF
01018* 01029* 01917* 01925 01928 02270 06302* 06383
09073*
STOMACH,NERVOUS CONTROL OF
00984* 01877 03140 03669* 03670* 03912* 04609* 04788
04854* 05420 05479 06304* 06385 06387 09039* 09049
STOMACH,TOXIC EFFECTS ON
02215* 03720 03899* 04767 04788 04800 04803 04888
05430 05503* 05740 05785 06368* 07297* 08181* 08387*
09058* 09329 09383* 09971* 09996
STRANGULATION
10184
STRESS
03103 03742* 04002 04005 04769*
STRESS FACTORS
01907* 02005 05494* 05862* 06136 07886 08956 10840
STRESS FACTORS IN ULCERS
00437* 00438* 00439* 00460* 00461* 00499 00501 01349*
01350* 02278 02279 02282 02283 03902* 03967* 03968*
04844* 04850* 04857* 04858* 04862* 04864 04891 04905
05773* 05820* 05826* 05828* 05829* 05832* 05833* 06709
07620* 08478* 09381* 09387 09388 09421 10268* 10319
STRESS,GRAVITATIONAL
00126
STRICTURE,BILIARY TRACT
00813 03510 06208* 06226 06234 08766* 09818 10787
STRICTURE,ESOPHAGUS
00381 00382 01291 01292 01293 01294 02186* 02206
02207 02211 02998* 03000* 03002* 03004* 03029 03886
04734 04738 04755 04758 05720* 05752 06598 07541*
07546 07563 07571 07575 08338 08356 08385 09238*
09257 09265 09269 09280 09281 09287 10164* 10165*
10166* 10187
STRICTURE,GASTROINTESTINAL
01700
STRICTURE,LARGE INTESTINE
02395 04128 04170 05069 06868 06899 08654* 08707
09520* 10468
STRICTURE,SMALL INTESTINE
00527 01394* 02306 02307 03131* 03169 03997 04023*
04047 04913* 06765 07810 08448 08562 08590 10514
STRICTURE,STOMACH
05765*
STRONTIUM ABSORPTION
00041* 00042*
STUDIES OF CANCER,CLINICAL
06684*
STUDIES OF HEPATITIS,CLINICAL
00717
STUDIES OF LIVER,EXPERIMENTAL
00192* 00211 01533 01625* 02046 06065*
STUDIES OF PANCREAS,CLINICAL
00643*
STUDIES OF PEPTIC ULCERS,CLINICAL
08498
STUDIES OF ULCERATIVE COLITIS,CLINICAL
00611* 07791
STUDY TECHNIQUES,ABSORPTION
01205* 01206* 06355 09200* 09202* 09921*
STUDY TECHNIQUES,DYE
SEE MARKER STUDIES
STUDY TECHNIQUES,GASTROINTESTINAL CIRCULATION
01171* 01183
STUDY TECHNIQUES,RADIOISOTOPE
SEE ALSO TRACER STUDIES
07820*
STUDY TECHNIQUES,SECRETION
00123 00124 00186 00189 00190 07474* 08206 08232*
09202*
STUDY TECHNIQUES,STOMACH SECRETION
00354 01195* 04611 04614 06401* 06414* 06524* 06735
09969* 09988* 09993* 09998 10261
SUCROSE ABSORPTION
05003
SUGAR INTOLERANCE
02329* 03188* 03190* 03201 04675* 06812* 06815* 06818*
07150* 07483* 07531 07713* 08614* 08615* 08618* 08622*
08631 08752* 08760* 09487 09491 09494 09499 09881
10412* 10420
SULFOBROMOPHTHALEIN
00229 00327 00705 00739* 01077* 01236 01237 01238
01548 01965* 02029 02039 02141 02154 02449* 02474
02848* 03826* 05165 05451* 05704 06136 06159 06531*
06985 07315* 07348* 07491* 07532 07846* 07848 08292*
08330 08778 09645* 09658* 09674 10040* 10631 10662
SURGERY COMPLICATIONS
00338 00377 00378 00395* 00470 00473 00475 00504*
00530 00572* 00582 00597 00629* 00695* 00749 00789
00803 00808 00852 01271* 01366* 01367* 01391 01484*
01626* 01646* 01675* 01677* 02052* 02099* 02188* 02191*
02193 02278 02279 02400* 02623 03212* 03224* 03225*
03242 03347* 03367 03494* 03564 03877 04442 04487
04789 04892 04943 05151* 05166 05294* 05389 05861*
05864* 05872 05945* 05965 06118 06225 06235 06238
06268 06587 06620* 06693* 06742* 06972* 06990 07020
07036 07567 07649* 07650* 07663 07669 07728* 07758
07762 07893* 07895* 08015* 08057 08059 08341 08345
08410 08475 08532 08540 08568 08600 08661* 08686
08744 08761* 08767* 08887* 08928 08964 08984 09425*
09439 09522* 09527* 09569 09570 09641* 09817 09850*
09872 10062* 10159* 10164* 10166* 10338* 10437* 10438*
10439* 10440* 10580* 10590* 10625 10667 10725* 10760*
10761* 10780 10797
SURGERY COMPLICATIONS,SMALL INTESTINE
04027 05861* 05863* 05869
SURGERY COMPLICATIONS,STOMACH
00404 01212 01297* 01326 01327 01339* 01357 01885
01933* 02119 02221* 02259* 02261* 02263* 02265* 02267*
02268* 02276 02280 03068 03836* 03908* 03909* 03938
03942 03975 03983 03984 04001 04019* 04117* 04798
04817 04869 04870 05339* 05764* 05767* 05771* 05772*
05791 05792 05794 05796 05797 05805 05823* 05827*
05830* 05831* 05843 05844 06713 07618* 07623* 08392*
09244 09295* 09349 10196*
SURGERY IN CHILDREN
00530 08307
SURGERY TECHNIQUES
00619 00662* 00771* 00790 00853 00874 01419* 01421*
01483* 01484* 01610* 01649* 01734 02347* 02349* 02373
02558* 02559* 03060* 03154 03172 03225* 03348* 03350*
03373 03453* 03463* 03625* 03731* 03829* 03924 03936
04302 04787 04791 04797 04829 04830 04831 04832
04860* 04872 04886 04909 04934 04941 04946 04953
05096* 05162 05270* 05273* 05297* 05385 05767* 05770*
05824* 05944* 05951* 06633 06737* 06741* 06959* 06963*
07726* 07739 07785 07975* 08047 08596 08649* 09123*
09274 09366 09426* 09430* 09632* 10188 10195* 10202*
10373 10428* 10440* 10466 10556* 10562* 10604 10726*

SURGERY TECHNIQUES.STOMACH
00429 01324 01338* 05772* 07595 07611 08425 09288*
09400 10267*
SURGERY.ABDOMEN
00406 00874 01371* 02616* 02670 03017 03595 04487
04913* 05052 05375 05376 05392 05787 06003 06268
07158 07177 07520 08011* 08015* 08026 08047 08055
08552 08964 09246 09251 09360 09843* 09859 10195*
10384 10851
SURGERY.ANORECTAL
07741 07759 07768 07772 08673 09527* 10432* 10435*
10439* 10440* 10441* 10456
SURGERY.ANUS
01442 01444 03219* 05079 06870 06901 07730 07732
10442* 10494
SURGERY.APPENDIX
02365 02366 04140 04145 06854 08645* 08667 08668
08670 08678 08679 08688 08690 08702
SURGERY.BILIARY TRACT
00629* 00763* 00764* 00772* 00774* 00784 00790 00802
00803 00804 01626* 01634 01641 01645 02163 02431*
02572* 02578* 02581 02586 02587 02599 02600 02763*
03348* 03490* 03492* 03493* 03494* 03499 03517 03519
03520 03542 03563 03593 03681* 04246 04413* 04426
04427 04431 04442 04443 04445 04449 04453 04722
05294* 05314 05318 06061* 06214* 06225 06244 06246
06693* 06972* 06973* 07108* 07113* 07124 07135 07139
07145 07975* 07992 07994 07996 08219* 08886* 08888*
08893 08897 08903 08905 08908 08919 08924 09796*
09797* 09799* 09812 09813 09817 09821 09831 09832
10211 10338* 10549 10649 10766* 10770* 10772* 10773*
10774 10781 10789 10792
SURGERY.CANCER
04799 05050 05098* 05103 05994 06071* 06582 07548
07605 07753 07769 07787* 08423 08648* 08697 08729
08907 08909 08980 09258 09268 09300* 09308 09323
09516* 09518* 09528* 09606 10178 10189 10231 10427*
10437* 10439* 10473 10481
SURGERY.CHOLELITHIASIS
07980* 07989 08887*
SURGERY.COLITIS
04161
SURGERY.DUODENUM
01326 01391 03148* 03169 03172 04042 04231 04251
05835 08033 10395
SURGERY.ESOPHAGUS
00363* 00385 01271* 01275 01282 01293 02088 02108
02186* 02187* 02188* 02189* 02191* 02208 02209 02991*
02993* 02995* 02996* 02997* 02998* 02999* 03000* 03001*
03002* 03003* 03005* 03006* 03007* 03008* 03009* 03015
03017 03026 03029 03031 03036 03037 03042 03043
03869* 03871 03873 03873 03877 03877 03883 03884
03884 03888 03892 03892 04724* 04730* 04731* 04732*
04733* 04736 04739 04742 04747 04749 04753 04755
04757 04761 04763 04767 05489* 05721* 05747 05752
06576 06577 06584 06585 06586 06587 06620* 07537*
07538* 07539* 07547 07550 07558 07560 07563 07566
07571 07575 08338 08340 08341 08343 08345 08346
08348 08349 08354 08359 08368 08375 08379 08381
08410 09237* 09249 09256 09257 09261 09266 09274
09278 09284 10158* 10159* 10163* 10164* 10173 10188
10214
SURGERY.GALLBLADDER
00760* 00783 00785 00786 00787 00788 00789 01644
02365 02577* 02579* 02762* 03094 03501 03508 03529
03530 04426 04434 04437 04443 04449 04450 04454
05326 05596 06208* 06209* 06219* 06223* 06235 06238
06241 07119 07141 08003 08911 08912 10780 10784
SURGERY.GASTROINTESTINAL
SEE ALSO GASTROINTESTINAL TREATMENT
00685 00853 00891* 01675* 01677* 01699 01703 01731
01732 01733 01734 02611* 02616* 02632 02636 02656
02665 02670 02681 03060* 03176 03287* 03558 03563
03564 03583 03593 03842 04812 05183 05370 05385
05389 06263* 06740* 06792 06934 06940 08021* 08048
08050 08945 08984 09848* 09876 10110 10185 10195*
10373
SURGERY.LARGE INTESTINE
00572* 00574* 00583 00597 01416* 01417* 01418* 01419*
01440 01441 01447 01647* 02345* 02346* 02347* 02348*
02349* 02353* 02355* 02359* 02371 02377 02379 02380
02381 02383 02400* 02401* 02402* 02403* 02966 03206*
03207* 03208* 03210* 03211* 03212* 03213* 03220* 03224*
03225* 03232 03234 03241 03242 03251 03252 03253
03254 03256 03274 03279 03288* 03292 03297 04016*
04040 04103* 04110* 04122* 04125* 04138 04149 04157
04158 04160 04174 04183 04184 04185 04186 04190
04206* 04209* 04913* 05012* 05012* 05016* 05018* 05021*
05022* 05045 05047 05062 05064 05065 05067 05075
05080 05081 05944* 05945* 05950* 05951* 05960 05965
05967 05975 05991 05994 06010 06011 06392 06431
06477 06737* 06742* 06774 06798* 06806 06841* 06859
06862 06865 06866 06867 06880 06887 07675 07698*
07700* 07724* 07725* 07726* 07727* 07729* 07740 07762
07776 07778 08054 08573 08602* 08650* 08653* 08654*
08656* 08661* 08669 08685 08686 08693 08694 08698
SURGERY.LARGE INTESTINE
CONTINUED
08701 08723* 09508* 09509* 09510* 09511* 09512* 09515*
09517* 09519* 09522* 09525* 09528* 09543 09551 09563
09574 09585* 10116* 10428* 10430* 10432* 10436* 10438*
10444 10450 10460 10462 10466 10467 10482 10484
SURGERY.LIVER
00703 00773* 01484* 01502 01504 01507 02430* 02484
02509 02839* 02840* 02841* 02842* 02859* 02864* 02867
02915* 03339* 03347* 03348* 03349* 03350* 03356 03367
03368 03369 03370 03371 03373 03374 03384 03393
03453* 03454* 03471 03472 03741* 03776 03787 04257*
04265* 04268* 04276* 04279 04282 04284 04296 04299
04302 04318 04400 04656 05149* 05151* 05162 05166
05166 05181 05182 05185 05283 05286 05556* 05587
05630 06068* 06071* 06072* 06093 06096 06099 06100
06118 06138 06196 06963* 06971* 06997 07825* 07872
07876 07893* 07895* 07986 08782 08808 08828* 08837
08838 09011 09130* 09632* 09654* 09690 09716* 10552*
10556* 10572* 10595 10625 10649 10671* 10770* 10771*
10773*
SURGERY.MESENTERY
04473
SURGERY.PANCREAS
00627* 00630* 01471* 01482 02408* 02410* 02412 03739
04042 04219* 04231 04234 04237* 04251 05096* 05098*
05100 05103 05106 05107 05610* 06052* 06057 06935
06937 06941 07801 07805 08033 09611 10512* 10649
SURGERY.PANCREATITIS
03329 03330 03333 04237* 06057 06948* 06949* 07813
08751 09619* 09621* 10532* 10538* 10544
SURGERY.PEPTIC ULCER
00260* 00446* 00447* 00453* 00465 00469 00470 00471
00473 00474 00476 00477 01335* 01336* 01356 01358
01359 02259* 02260* 02261* 02262* 02263* 02264* 02265*
02266* 02275 02276 02277 03061* 03128* 03135 03142
03145 03970* 03971* 03972* 03979 03981 03983 03990
03996 03998 04000 04001 04003 04019* 04117* 04608*
04844* 04846* 04847* 04854* 04857* 04859* 04860* 04865
04869 04870 04872 04873 04875 04877 04881 04883
04886 04887 04890 04892 04895 04897 04900 04901
04903 04905 04909 04910 04911 04973* 05299 05636*
05821* 05822* 05823* 05824* 05830* 05835 05838 05843
05844 05846 05847 05852 06691* 06708 06713 06716
06724 06726 07617* 07626* 07636 07641 08490 08492
08495 08507 08512 08513 09389 09390 09391 09397
09399 09403 09404 09411 10272* 10294 10300 10301
10303 10304 10308 10321 10323 10329 10330*
SURGERY.PORTAL HYPERTENSION
01488* 06109 06126 06190* 06196 06201 06203 06204
06205 07010 07808* 07828* 07875 07953* 08754* 08759*
08796 08807 09123* 09615* 09644* 09781* 09789 10553*
10562* 10570* 10580* 10616 10624 10668 10726* 10755
10772*
SURGERY.RECTUM
00566* 03217* 03231 03247 03269 03277 03278 04135
04152 04153 04182 04183 04193 05025 05050 05950*
06011 06852 06902 07723* 07729* 07739 07778 07785
08054 08677 09529 09540 09569 09570 10428* 10437*
10465 10478 10480
SURGERY.SALIVARY GLAND
00842
SURGERY.SMALL INTESTINE
00091* 00504* 00505* 00629* 01022* 01366* 01379 02051*
02284* 02286* 02288* 02303 02320* 02321* 02745* 02758*
03124* 03149* 03152 03154 03156 03288* 03305* 03802*
04016* 04021* 04025 04028 04032 04034 04036 04040
04041 04042 04066 04094 04686* 04832 04860* 04916*
04917* 04919* 04924 04934 04935 04941 04943 04946
04951 04959 04960 05150* 05603* 05637* 05868 05869
05870 05871 05872 05881 05898 05911* 05945* 06076*
06392 06431 06477 06737* 06742* 06743* 06746* 06755
06756 06770 06774 06786 06788 06798* 06806 06880
06926* 07150* 07649* 07650* 07651* 07669 07671 07675
07680 07698* 07699* 07700* 07702 07705* 08089* 08141*
08523* 08538 08554 08569 08572 08573 08575 08596
08601* 08602* 08623* 08662 09027* 09117* 09179* 09185*
09425* 09430* 09444 09474 09475 10117* 10284* 10332*
10333* 10335* 10343* 10347 10350 10354 10385 10391*
10394 10430* 10509* 10760* 10792 10807* 10808*
SURGERY.STOMACH
SEE ALSO GASTRECTOMY
00303 00411 00412 00456* 00474 00482 01298* 01325
01646* 02117 02214* 02227 02231 02232 02234 02235
02236 02237 02238 02242 02251* 02260* 02684 02797*
02927 02997* 03053* 03055* 03056* 03065 03069 03070
03082 03088 03090 03092 03112 03123* 03546* 03699*
03865 03866 03873 03898 03912* 03917 03922 03924
03925 03926 03931 03936 03937 03943 03944 03945
03947 03955 03961 03963 03964 03965 03990 03997
03998 04487 04608* 04682 04728* 04756 04767 04770*
04772* 04773* 04774* 04775* 04776* 04780* 04787 04789
04791 04797 04799 04809 04812 04829 04830 04831
04832 04833 04839 04843 04846* 04847* 04854* 04859*
04860* 04865 04872 04873 04924 04973* 05636* 05670
05744 05747 05751 05770* 05775 05778 05781 05787

SURGERY,STOMACH
CONTINUED
05822* 05824* 05847 06612* 06631 06645 06656 07542*
07549 07566 07577* 07579* 07587* 07588* 07608 08348
08388* 08391* 08393* 08410 08420 08472 08669 08908
09083 09296* 09303* 09306 09341 09346 09357 09358
09365 09396 10111 10211 10214 10246 10254 10327
10549
SURGERY,ULCER
06567* 06705 06711 06718 06722 06725 07618* 07623*
07637 07644 08393* 08488 08510 09400 09401 09412
09416 10267* 10283* 10284* 10295 10318 10325 10327
10805*
SURGERY,ULCERATIVE COLITIS
00611* 00619 04208* 05863* 05975 06022* 07792 08648*
08655* 08726 09595 09597 10345* 10439* 10502* 10504*
SURGERY,VASCULAR
00205* 00206* 00207* 06521 08333* 08762* 09123* 09429*
09702 10169 10179 10581* 10590* 10624 10666 10818*
10828
SURGICAL APPARATUS
02587
SURGICAL APPARATUS AND TECHNIQUES
08355 08426 08433 09198* 09208* 09212* 09513* 09525*
10263 10763*
SURGICAL TECHNIQUES,EXPERIMENTAL
00243 04292* 04686* 05158* 05182 05185 05898 06061*
06068* 06190* 06304* 06416* 06928* 07373 07821* 07845*
08077* 09183* 09184* 09188* 10041*
SURGICAL TREATMENT OF BLEEDING
07645 09361 09392 10179 10262 10268*
SURVIVAL RATES,CANCER
02344* 02345* 02346* 02348* 03960 04772* 05012* 05014*
05769* 05947* 05948* 05950* 06071* 06971* 07733 07829*
08651* 08652* 09508* 09518* 10427*
SYNDROME,BLIND LOOP
03176 06755 07710* 08589
SYNDROME,BUDD-CHIARI
00751 02436* 02437* 02562* 02619* 03383 04257* 05145*
05156* 06066* 07002 08768* 08815 09666 09682 10570*
SYNDROME,CARCINOID
SEE ALSO CARCINOIDS
SEE ALSO SEROTONIN
02646
SYNDROME,CUSHINGS
08178* 09698 09979*
SYNDROME,DUBIN-JOHNSON
00653* 01495* 01496* 01554 02106* 02449* 04261* 04311
07952 09685 10614 10622
SYNDROME,DUMPING
00504* 03068 04805 08550 09425*
SYNDROME,GARDNERS
06897 07668 09515* 09799* 10429* 10452
SYNDROME,GASTRECTOMY-INDUCED AFFERENT LOOP
00256* 00456* 00482 01339* 01392* 02221* 03955 06654
10284*
SYNDROME,GASTRECTOMY-INDUCED DUMPING
00256* 01339* 01340* 01341* 02267* 04773* 04846* 04854*
05827* 06617* 08503 08512 09331 10210 10284*
SYNDROME,MALLORY-WEISS
04792 04838 05774* 06593 08308 08357 10236
SYNDROME,PEUTZ-JEGHERS
00538 02680 03177 03178 03257 03267 04052 04931
06740* 06744* 06792 07657 07693 08524* 08535 09447
09454 10358 10359 10364 10365
SYNDROME,ROTORS
10612
SYNDROME,SJOGRENS
00654* 03566 04460* 08938* 09203* 10812*
SYNDROME,ZIEVES
00753
SYNDROME,ZOLLINGER-ELLISON
00825* 00847 00848 01653* 01654* 02620* 02621* 03587
03588 03594 04477 04581* 05339* 05340* 05341* 05342
05343 06259* 06567* 07089* 07182 08020* 08033 08481*
08730 08975 08976 09847* 09848* 09852 09873 10527
10809*
SYPHILIS
06987 06988 06989 08832

TEMPERATURE FACTORS
00241* 00957* 00988* 01171* 01344* 01555* 01558* 01682*
01970* 02214* 02282 02907* 04016* 04519 04667 05513
05517 05540* 05549* 05626* 06363 06517* 07261 07342*
07365 07447 07455 08132 08296 08833 09052*
THERAPY,DIETETIC
02482 03994 04084 04307 04983 04989 05143* 06262*
06821 06947 07713* 08945 08971 09027* 09337 09705
10129 10411*
THERAPY,DYSENTERY
05346
THERAPY,MUD
10599
THIAMINE
01664* 01954* 03460* 09146
THIAMINE ABSORPTION
01856 01857 04088
THROMBOSIS
00681 00685 06661
THROMBOSIS,HEPATIC VEIN
SEE ALSO BUDD-CHIARI SYNDROME
10558* 10666
THYMUS GLAND
04636* 05085* 10025*
THYROID GLAND
03800* 04597* 04623* 05875 06609* 06833* 08742* 09097
09236 09669 10078* 10376 10641
TISSUE ADHESIVES
09876 10202* 10590*
TOLERANCE TESTS
02449*
TOLERANCE TESTS IN MALABSORPTION DIAGNOSIS
00549*
TOXIC EFFECTS OF RADIATION
SEE ALSO TOXIC EFFECTS ON ABSORPTION
SEE ALSO TOXIC EFFECTS ON BILIARY TRACT
SEE ALSO TOXIC EFFECTS ON ESOPHAGUS
SEE ALSO TOXIC EFFECTS ON GASTROINTESTINAL TRACT
SEE ALSO TOXIC EFFECTS ON LARGE INTESTINE
SEE ALSO TOXIC EFFECTS ON LIVER
SEE ALSO TOXIC EFFECTS ON PANCREAS
SEE ALSO TOXIC EFFECTS ON RECTUM
SEE ALSO TOXIC EFFECTS ON SMALL INTESTINE
SEE ALSO TOXIC EFFECTS ON STOMACH
00026 00028 00095* 00347 00702* 00826* 00924 01455
01571 01572 02200 02309 03565 03804* 04024* 04258*
04271* 04333 04673* 04674* 04964 05364 05607* 06337
06368* 06777 06843 07046 07334* 07402 07449* 07463
07664 07689 07843* 08040 08841 09058* 09165 09167
09466 09714* 09937* 10156 10255 10342* 10430* 10445
10642
TOXIC EFFECTS ON ABSORPTION
09936* 09937*
TOXIC EFFECTS ON BILIARY TRACT
01969* 06233 07326* 09816
TOXIC EFFECTS ON CIRCULATION
02085*
TOXIC EFFECTS ON ESOPHAGUS
00373 03879 04735 04746 04754 04755 04766 04767
05740 06571*
TOXIC EFFECTS ON GASTROINTESTINAL TRACT
01770 03565 03879 04482 05344 05345 05607* 06264
06272 07040* 07166 10156 10830
TOXIC EFFECTS ON LARGE INTESTINE
00568* 02405* 02407 05949* 05970 05990 10430* 10445
TOXIC EFFECTS ON LIVER
00191* 00197* 00198* 00219 00222 00705 01087* 01088*
01089* 01092* 01093* 01147 01556* 01557* 01558* 01559*
01567 01568 01569 01570 01974* 01979 02008 02023
02024 02025 02026 02027 02028 02029 02030 02032
02035 02491* 02492* 02493* 02493* 02496 02497 02499
02500 02501 02503 02504 02506 02507 03405* 03406*
03408* 03409* 03410 03411 03412 03413 03417 03418
03419 03603* 04295 04333 04334 04335 04336 04337
04338 04339 04340 04389* 04391* 04423* 04659 05147*
05210* 05211* 05212* 05213* 05214* 05216 05217 05218
05219 05538* 05555* 05558* 05655* 06110 06143* 06144*
06146* 06147 06148 06149 06150 06151 06152 06153
06154 06155 06157 06158 06313* 06325 06331 06432*
06433* 06438* 06442* 06443* 06446* 06456* 06457* 06476
06500 06501 06502 06608* 07016 07039* 07046 07047
07084* 07312* 07313* 07320* 07322* 07327* 07334* 07336*
07340* 07352 07362 07390 07824* 07867 07883 07891*
07894* 07898* 07901* 07902 07903 08079* 08111 08127*
08227* 08228* 08231* 08235* 08236* 08238* 08245* 08249*
08825* 08827* 08831 08833 08841 08843 09102* 09103*
09106* 09107* 09121* 09135* 09144 09167 09642* 09714*
09718 09720 09723 10022* 10028* 10031* 10048* 10054*
10055* 10056* 10058* 10066* 10070* 10095 10642 10646
TOXIC EFFECTS ON PANCREAS
04238* 04241* 06034* 06049 10005* 10006*
TOXIC EFFECTS ON RECTUM
01455
TOXIC EFFECTS ON SMALL INTESTINE
00026 00048* 00826* 02309 02341 04673* 04674* 04963
05430 05866 05873 05915* 06337 06777 07205* 07238*
07449* 07655* 09058* 09466 10342* 10430*
TOXIC EFFECTS ON STOMACH
02215* 03720 03899* 04767 04788 04800 04803 04888
05430 05503* 05740 05785 06368* 07297* 08181* 08387*
09058* 09329 09383* 09971* 09996
TOXIC HEPATITIS
SEE ALSO TOXIC EFFECTS ON LIVER
00700* 00701* 07047 07841* 08823* 09717* 09722 10633
10672* 10674* 10675*
TOXINS,BACTERIAL
00060* 00061* 01625* 06506* 07152* 07652* 07655* 08527*
09049 09424* 09849* 09936* 10811* 10841

TOXINS,CHEMICAL
SEE ALSO TOXIC EFFECTS ON BILIARY TRACT
SEE ALSO TOXIC EFFECTS ON ESOPHAGUS
SEE ALSO TOXIC EFFECTS ON GASTROINTESTINAL TRACT
SEE ALSO TOXIC EFFECTS ON LARGE INTESTINE
SEE ALSO TOXIC EFFECTS ON LIVER
SEE ALSO TOXIC EFFECTS ON PANCREAS
SEE ALSO TOXIC EFFECTS ON RECTUM
SEE ALSO TOXIC EFFECTS ON SMALL INTESTINE
SEE ALSO TOXIC EFFECTS ON STOMACH
00191* 00197*
TRACE ELEMENT AND MINERAL ABSORPTION
01833* 01837* 01838* 01839* 07257
TRACE ELEMENT AND MINERAL DEFICIENCIES
00934 01096 01673* 01759 02011
TRACE ELEMENT AND MINERAL METABOLISM
06418 07794* 08259
TRACE ELEMENT METABOLISM,LIVER
00006* 01499* 07364
TRACER STUDIES
00269* 00327 01240 01241 01242 01325 01403 02114
02115 02135 02136 02142 02143 02144 02736* 03547*
03566 03656 03823 03848 04558 04632* 04645* 04692*
04701* 04975* 05262* 05264* 05296* 05602* 05692 05706
05860 06052* 06369* 06957* 06982 07339* 08248* 09154
TRANSPLANTATION
SEE IMMUNOLOGY
TRANSPLANTATION,LIVER
01483* 01485* 01507 01975* 02429* 02432* 02443* 02867
03349* 03356 03371 03393 03776 03831* 04270* 05158*
05182 05185 06959* 06973* 07425 07468 07838* 07845*
08250* 08761* 08767* 08827* 09119* 09124* 09183* 09194
09334 09631* 09641* 09654* 09675 10018* 10041* 10062*
10069* 10591* 10692* 10694*
TRANSPLANTATION,PANCREAS
04234 05096* 06925* 06928* 06929* 06942 10511*
TRANSPLANTATION,SMALL INTESTINE
01000 02758* 03149* 03610 03631* 03873 03884 04021*
04022* 04959 06309* 06925* 06928* 06942 07240* 07456
07647* 08077* 10362
TRANSPLANTATION,STOMACH
03070 06419
TRANSPORT,ION
00033* 00034* 00035* 00046* 00051* 00052* 00053* 00055*
00059* 00061* 00063* 00064* 00077 00086 00953* 00961
00966 01013* 01014* 01047 01048 01078* 01847* 01854
01857 02732* 02733* 02744* 02750 02795* 02796* 03285*
03627* 03628* 03629* 03632* 03636* 03637* 03638* 03641*
03646* 03647* 03653 03658 03659 03660 03794* 03902*
04211* 04212* 04484 04514 04531* 04532* 04533* 04537*
04538* 04539* 04540* 04541* 04543* 04551 04552 04556
04592* 04669* 05434* 05436* 05439* 05440* 05442* 05447*
05450* 05451* 05456 05457 05463 05480 05495* 05568
05833* 05935 06346* 06347* 06353* 06817* 07241* 07258
07290* 07360 07418 07455 08114* 08126* 08180* 08186*
08225* 08387* 08480* 08940* 09029* 09035 09062* 09084
09138* 09200* 09932* 09934* 09971* 10015* 10126*
TRAUMA IN CHILDREN,ABDOMEN
06790 07692 07895* 08830* 08834
TRAUMA,ABDOMEN
00351 01370* 01689 01719 02677 04042 04466 04468
04479 04913* 05104 05365 05880 06583 06768 07006
07123 07143 07181 07196 07480* 07505 07533 07676
07678 07724* 07799 07885 07899* 07900* 07904 08036
08044 08049 08063 08548 08559 08826* 08839 08973
09863 10671*
TRAUMA,BILIARY TRACT
00063* 07139 07143
TRAUMA,DUODENUM
02299 07677
TRAUMA,ESOPHAGUS
00372 00387 01291 02194 02207 03011 03034 03872
03879 03881 03883 03885 03889 04743 05735 05736
05740 05749 10171
TRAUMA,GALLBLADDER
07123
TRAUMA,GASTROINTESTINAL
01364 01687 02605* 03573 03879 04016* 04468 05382
05393
TRAUMA,LARGE INTESTINE
03232 05960 05964 05965 06865 10488
TRAUMA,LIVER
00676 00687 00703 01503 01504 02138 02150 02488
02510 02619* 02866 03414 03681* 03767 04303 04466
05164 05183 05187 05570 05629 06070* 06091 06099
06100 06336 06768 06994 08836 08838 08839 08997
09721 10650 10677 10678
TRAUMA,PANCREAS
00644* 00645 02410* 03321 04229 04230 04466 05096*
05104 05105 06936 07817
TRAUMA,RECTUM
00566* 01454
TRAUMA,SMALL INTESTINE
02897* 04922 04925 04964 05880 05888 05908 06352*
06753 06790
TRAUMA,STOMACH
02214* 02239 03081 03935 03943 03965 04824 04858*
05740 05773* 05810 09895*
TROPICAL SPRUE
00545* 00546* 01197* 01392* 02332* 02333* 02334* 02335*
02336* 03189* 03199 04081* 04100 04990 04992 04999
06811* 06816* 07712* 08624 10406* 10415*
TRYPSIN
01936* 02075 02657 02658 04256 05534* 07306*
TRYPSIN INHIBITION
07970 09080*
TRYPSIN INHIBITION,PANCREAS
05534* 09090*
TRYPSIN SECRETION,PANCREAS
01051* 01062 02817* 05534* 07308*
TUBERCULOSIS
00868 03181 03205* 04057 04148 04818 05142* 05764*
05966 06634 06855 07562 07783 08448 08772 08963
09328 09440 10286 10363 10829
TUBERCULOSIS,LIVER
00680
TUMORS,BENIGN LARGE INTESTINE
05993
TYPHOID FEVER
SEE ALSO SALMONELLOSIS
02313 02314 05230 07656* 10768*
TYPHOID FEVER COMPLICATIONS
10372

ULCER COMPLICATIONS,PEPTIC
01340* 02250* 03146 03989 03993 03997 04004 04849*
04866 04868 04882 04889 04892 04893 05823* 05827*
05836 05840 05853 08338 08403 08491 09384
ULCER DIAGNOSIS
03836* 06689* 07622* 07640 08291* 10235
ULCER DIAGNOSIS,PEPTIC
00304 02097* 02118 02120 02121 02920* 03985 03987
04010 04874 04878 04880 04904 04906 07511 10324
10330*
ULCER DIAGNOSIS,RADIOLOGY IN PEPTIC
07630 08516
ULCER EPIDEMIOLOGY
06685* 09412
ULCER EPIDEMIOLOGY,PEPTIC
00451* 00454* 00457* 00458* 00459* 00461* 03992 04848*
04884 05151* 05821* 07617* 07634 09406 10317
ULCER ETIOLOGY
03874 07620* 07625* 07643 08180* 08482* 08485* 09412
09414 10299 10310 10319
ULCER ETIOLOGY,PEPTIC
00454* 00460* 00465 00478 01342* 01360 01364 02249*
02254* 02255* 02270 02271 02272 02273 02280 02320*
02622 02792* 02794* 02931* 03130* 03704* 03710* 03982
03987 04267* 04844* 04848* 04850* 04853* 04858* 04888
04891 04907 05768* 05831* 05833* 05857 05860 07617*
08480* 10305 10313
ULCER IMMUNOLOGY,PEPTIC
04867
ULCER PATHOLOGY
04858*
ULCER PATHOLOGY,PEPTIC
02269 03995 04862* 05802 05848 05852 05855 05893
07615* 08498
ULCER PERFORATION
02250* 06725 06729 07639 07793* 08500 08534 10318
ULCER PERFORATION,PEPTIC
00458* 00468 01351* 02277 02281 03978 04008 04890
04893 05821* 05834 05840 05851 05859 08492 08494
08508 09393 10311 10322
ULCER PROPHYLAXIS,PEPTIC
05832* 05850 09072* 09379* 10271* 10307
ULCER SURGERY
06567* 06705 06711 06718 06722 06725 07618* 07623*
07637 07644 08393* 08488 08510 09400 09401 09412
09416 10267* 10283* 10284* 10295 10318 10325 10327
10805*
ULCER SURGERY,PEPTIC
00260* 00446* 00447* 00453* 00465 00469 00470 00471
00473 00474 00476 00477 01335* 01336* 01356 01358
01359 02259* 02260* 02261* 02262* 02263* 02264* 02265*
02266* 02275 02276 02277 03061* 03128* 03135 03142
03145 03970* 03971* 03972* 03979 03981 03983 03990
03996 03998 04000 04001 04003 04019* 04117* 04608*
04844* 04846* 04847* 04854* 04857* 04859* 04860* 04865
04869 04870 04872 04873 04875 04877 04881 04883
04886 04887 04890 04892 04895 04897 04900 04901
04903 04905 04909 04910 04911 04973* 05299 05636*
05821* 05822* 05823* 05824* 05830* 05835 05838 05843
05844 05846 05847 05852 06691* 06708 06713 06716
06724 06726 07617* 07626* 07636 07641 08490 08492
08495 08507 08512 08513 09389 09390 09391 09397
09399 09403 09404 09411 10272* 10294 10300 10301
10303 10304 10308 10321 10323 10329 10330*

ULCER TREATMENT
04814 07639 08468 09382* 09406 09413 10288
ULCER TREATMENT,PEPTIC
00472 00478 01336* 02274 03119* 03124* 03126* 03128*
03133* 03136 03137 03140 03141 03143 03701* 03973*
03974* 03977 03980 03988 03991 03994 03999 04006
04008 04009 04013 04845* 04851* 04852* 04861* 04863
04871 04875 04876 04877 04879 04894 04896 04898
04899 04900 04902 05510* 05818* 05819* 05825* 05839
05845 05846 05850 05851 06733 08403 08494 08501
08502 08508 09377* 10297 10302 10305 10322 10323
ULCER,GASTRECTOMY-INDUCED RECURRENT
04860* 07624* 08503
ULCERATIVE COLITIS
00540* 00589 00614 00617 01457* 01458* 02397* 02401*
02402* 02406 02407 02597 02622 03285* 03286* 03287*
03290* 03291 03291 03291* 03292 03293 03294 03295
03296 03298 03300 03301 03302 03570 04124* 04213
04215 04216 04217 04269* 05087 05089 06801* 06891
06914* 06915* 06916* 06917* 06918* 06920* 06921 06922
07781 07787* 08642 08643* 08655* 08701 08725 09472*
09585* 09587 09588 09591 09592 09593 09925* 10291
10336* 10435* 10499* 10501* 10506 10507
ULCERATIVE COLITIS COMPLICATIONS
00612* 04214 05139* 06023* 06024* 06026 06029
ULCERATIVE COLITIS DIAGNOSIS
00618 00624 01231 01460 02133 02399* 03303 04204*
05086 06923 08724 09584* 09589 10434* 10500*
ULCERATIVE COLITIS DIAGNOSIS,RADIOLOGY IN
08722*
ULCERATIVE COLITIS EPIDEMIOLOGY
02404* 04218 06018* 06019* 07789* 08655* 10499* 10503*
ULCERATIVE COLITIS ETIOLCGY
00610* 00623 02405* 04203* 04218 05085* 06007 09586*
09598
ULCERATIVE COLITIS HISTOLOGY
00608*
ULCERATIVE COLITIS IMMUNOLOGY
00609* 00615 00621 00622 00623 05085* 06918* 10392*
10505 10587*
ULCERATIVE COLITIS IN CHILDREN
01461 04207* 05004 05088 05090 06022* 06027 06919*
08721*
ULCERATIVE COLITIS PATHOLOGY
01456* 01459 01461 04203* 04218 06022* 06025 06028
09594
ULCERATIVE COLITIS SURGERY
00611* 00619 04208* 05863* 05975 06022* 07792 08648*
08655* 08726 09595 09597 10345* 10439* 10502* 10504*
ULCERATIVE COLITIS TREATMENT
00611* 00616 02655 04205* 04206* 04209* 05086 05091
06021* 06025 06030 06917* 08721* 10502*
ULCERATIVE COLITIS,CLINICAL STUDIES OF
00611* 07791
ULCERATIVE COLITIS,DISEASES ASSOCIATED WITH
00611* 00612* 00613* 00620 01462 01647* 02397* 02398*
02399* 02400* 02403* 06023* 06024* 08643* 08721* 08725
09586* 09590
ULCERATIVE COLITIS,DRUG TREATMENT OF
02396* 02404* 06915* 06919* 06924 09596
ULCERATIVE COLITIS,IMMUNOLOGY IN
06916*
ULCERS
SEE ANTACIDS
SEE ANTICHOLINERGIC AGENTS
SEE DUODENUM
SEE GASTRECTOMY
SEE ULCERATIVE COLITIS
ULCERS IN CHILDREN,PEPTIC
02281 03138 04848* 04908 05850 09390
ULCERS,AGE FACTORS IN
06682*
ULCERS,AGE FACTORS IN PEPTIC
00464 04884 08490 09386 10295
ULCERS,ANASTOMOTIC
08464
ULCERS,BLEEDING PEPTIC
00395* 00424 00433* 00470 00497 00498 01328* 01336*
04014 04868 04882 04895 05773* 05820* 05849 06730
06732 07581* 07645 08514 08934* 09386 09392 09417
10281* 10295 10306
ULCERS,CIRCULATION IN PEPTIC
09409
ULCERS,CLINICAL STUDIES OF PEPTIC
08498
ULCERS,DISEASES ASSOCIATED WITH
01343* 06731 10287
ULCERS,DISEASES ASSOCIATED WITH PEPTIC
00144* 00391* 00459* 00479 00847 01351* 02253* 02320*
02321* 05802 06627 07511 07621* 08505 10228 10298
ULCERS,DRUG TREATMENT OF
01332* 01333* 02258* 03118* 03701* 03967* 04845* 04851*
06690* 06696* 08485* 10276* 10277*
ULCERS,DRUG TREATMENT OF PEPTIC
00438* 00467 00489 00493 00494 00495 00496 01329*
01330* 01331* 01345* 01353 01354 01355 03126* 03129*
03137 03967* 03973* 03974* 03999 04769* 04845* 04851*
04861* 04876 04877 04879 05820* 05825* 05845 06686*
06706 07619* 07642 09427* 10292 10313 10314
ULCERS,DRUG-INDUCED
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